THE ENGINEERING AND MINING JOURNAL

Mixed Sulphide Ore Treatment.*

BY W. R. INGALLS.

The most material progress in the metallurgy of zinc during the last five years has been in the methods of concentrating low-grade ores, and especially the mixed ores in which the sulphides of lead, zinc and iron occur together. It is natural that practical developments should occur chiefly in this direction. Smelting is always an expensive process, while concentration is a cheap process. It is generally profitable, therefore, to condense the mineral values of an ore to the smallest possible bulk by the cheap process, in order to save the cost of treatment by the costly process, providing that the losses of mineral be not too high. There is always one line in the combined treatment of an ore between the mine and the metal warehouse which will show the minimum of economy, and both miner and smelter will aim to follow that line. The results both of practice and theory show that it is ordinarily most profitable to concentrate the crude ore to a very high degree, especially in the case of zinc ore.

Heretofore, the Joplin district of Missouri has been the only zinc producing region of the United States that has afforded a concentrated blende, assaying upward of 60% and averaging about 58% zinc. At least two other districts, however, are now giving ore as high in zinc as the average Joplin product. These are Creede, Colo., and the Wisconsin area. The ore of Creede is a non-ferruginous blende, associated with galena and a quartzose gangue, and being free from pyrites, it is feasible by careful concentration to make a high grade of zinc product. As a matter of fact, carload shipments from at least one mill assay 57 to 62% zinc, 1.5 to 3% lead, 1 to 2% iron, and 3.5 to 6.5% insoluble matter.

Similarly, ore containing approximately 60% zinc, and only about 1% lead and 2% iron, is now produced from the mixed blende-marcasite concentrate of Wisconsin, by the Blake electrostatic separator, and by magnetic separation of the minerals after a preliminary roast sufficient to render the marcasite magnetic.

The first great step in the separation of the mixed sulphide ores, such as occur at Leadville, Colo., was the introduction of the Wilfley table, about 10 years ago. These ores had previously been concentrated by the ordinary method of jigging and washing on vanners or round tables, but with indifferent success, the process being profitable only with comparatively high-grade ore. In order to treat successfully the lowest grade of ore, fine grinding was necessary, followed by an efficient means of washing a fine pulp, such as was afforded by the Wilfley table. By means of fine grinding and the Wilfley table, it became possible to make a zinc concentrate assaying about 40% zinc. The introduction of the Wetherill magnetic separator in the treatment of these ores enabled a concentrate of 45% zinc to be made, but it was always doubtful whether the increased grade of the ore compensated for the increased cost of the process. The Blake electrostatic separator (first applied to the treatment of middling from the Wetherill machines in the mill of the Colorado Zinc Company, and later applied to the treatment of raw ore), enables a concentrate assaying approximately 50% zinc to be made, and in this case there was evidently a distinct advantage.

In concentrating an ore assaying 24% zinc, 25% iron, 6% lead, 4% silica, and 8 oz. silver per ton, by crushing to 30 mesh and washing on Wilfley tables, according to the practice at Leadville at the present time, the product of 1 ton of crude ore is approximately 800 lb. of zinc ore, assaying 37 to 39% zinc, 15 to 18% iron, 2.5% lead, 3 to 5% silica, and 4 oz. silver per ton; and 860 lb. of iron-lead ore assaying 14 to 18% lead, 26 to 30% iron, 11% zinc, 3% silica, and 9 to 10 oz. silver per ton.

In treating the same ore by the Blake separator, there is an escape of about 40 lb., or 2%, in dust. The remaining 1,960 lb. comprises 660 lb. of zinc ore, assaying 50% zinc, 7% iron, 1% lead, 6% silica, and 3.5 oz. silver per ton; 1,100 lb. of iron-lead ore, assaying 35% iron, 9% lead, 8% zinc, 2% silica, and 11 oz. silver per ton; and 200 lb. of dust assaying 28% zinc, 8% lead, 19% iron, 3% silica, and 7 oz. silver per ton. This dust is assumed to have no value, since it cannot be handled on the Blake separator, but undoubtedly it can be concentrated wet with a fair saving of value.

Comparing the results of wet with those of dry concentration of the same ore, it appears that the former gives the following products:

0.40 ton zinc ore, valued at $10 per ton.	$4.00
0.43 ton iron-lead ore at $8.....	3.44
Total recovery per ton of crude ore..	$7.44

Dry concentration by the electrostatic process gives:

0.33 ton zinc ore, valued at $18 per ton.	$5.94
0.55 ton iron-lead ore at $7.50.....	4.12
Total recovery per ton of crude ore..	$10.06

This shows a difference of $2.62 per ton in the value of the products by the two processes, due chiefly to the enhancement of the value of the zinc ore by concentration from 38% up to 50% zinc. The value of the zinc ore in the above table, presented only for purpose of illustration, is computed on a moderate basis, much lower than the present market price. The cost of concentration by the two methods will not be widely different in properly designed mills, although at the present time it is rather in favor of the simple method of wet concentration. A possible further credit in favor of the dry process may lie in the 200 lb. of dust which is not now treated.

It is extremely doubtful if any hydrometallurgical or electrometallurgical process, even under the most favorable conditions, could show a commercial superiority over the present combination of standard methods in the treatment of such an ore as has been referred to. Starting with an ore containing 24% zinc and 6% lead, separated at a cost of about $1 per ton, approximately 0.33 ton of zinc ore, containing 50% zinc, or nearly 69% of the zinc in the original ore, and 0.55 ton of lead-iron ore containing 9% lead, or approximately 82.5% of the lead in the original ore, are obtained. Carrying the computation forward to the final extraction of the metals, good practice should yield about 60% of the original zinc and 78% of the original lead at an aggregate cost not to exceed $7 per ton of crude ore, disregarding freights, interest, amortization of plant, etc. A complete analysis of this problem would be quite complicated, but the above figures will give a rough indication of the present state of the art.

In Australia, electrostatic separation has proved inapplicable to the ores of Broken Hill, but the latter are capable of separation both by the electromagnetic and the flotation processes, a concentrate assaying from 40 to 45% in zinc being produced by either method. The technical details of the flotation processes have not yet been publicly described, and probably will not soon be, in view of litigation pending between the owners of the Delprat and the Potter processes over priority of the invention.

A recent communication in the news columns of this JOURNAL throws light upon the results obtained by the Potter process. According to this the Block 14 Company, during a five weeks' run in the autumn of 1904, treated 2,450 tons of tailing, assaying 17.6% zinc, 6.3% lead, and 7.6 oz. silver per ton. The first-class concentrate amounted to 739 tons, assaying 42% zinc, 5.5% lead, and 11 oz. silver per ton. Of middling product, 95 tons, assaying 22.5% zinc, 13% lead, and 13.5 oz. silver per ton, was also produced. These figures indicate a recovery in the first-class concentrate of 72% of the zinc, and 26% of the lead, the concentrate amounting in weight to 30% of the crude ore. Evidently the flotation of zinc blende in a slightly acid bath is more active than the flotation of galena, but so clean a separation of galena as is obtained by the electrostatic process apparently is not possible. Ore designed for separation by the flotation process should be very finely crushed, wherefore it would appear that this process may be a valuable adjunct to the

*From advance sheets of a paper in *The Mineral Industry*, Vol. XIII.

electrostatic and electromagnetic processes. Indeed, the best results in the treatment of mixed ores are in most cases to be expected from the combination of two or three of the new processes.

Air in Roasting.

BY WILLIAM E. GREENAWALT.*

Much oxygen is consumed in roasting sulphides, and a highly oxidizing atmosphere is essential to good results. With the sulphur fumes and the products of combustion from the fire-boxes passing over the partly roasted ore in the rear of the furnaces, while the atmosphere may not be strongly reducing, it is certainly not highly oxidizing. A comparatively small amount of sulphur dioxide in the furnace will greatly retard oxidation. If, in addition to the sulphur dioxide, the atmosphere is charged with carbon dioxide from the fire boxes, effective roasting is practically prohibited. The only advantage to be gained in passing these deleterious gases over the fresh ore as it is introduced into the furnace is to heat it, so that oxidation can proceed more rapidly when it reaches an oxidizing atmosphere.

It is desirable to bring the sulphides to the ignition temperature as soon as possible after the ore is introduced into the furnace. The value of the hot gases passing over a long stretch of cold ore to heat it and thereby save fuel is largely overestimated. The loss will exceed the gain.

With a deep bed of ore in the furnace, say, from 3½ to 5 in. deep, even in a highly oxidizing atmosphere, only the ore on the surface is under thorough oxidizing conditions; while that below the surface is not so advantageously placed. If overheated, therefore, fusion or matting is likely to occur in the early stages of roasting, and when the ore is heated too quickly to get a correspondingly quick oxidation. If fusion occurs, the particles assume a dark, glazed appearance. In this condition it is difficult to sufficiently eliminate the sulphur. The metals, too, are difficult to extract, owing to the inability of the solvent to penetrate the pores of the particles.

There is also quite as much danger of over-roasting as under-roasting. Ore, roasted too much, will give high tailing, nor can this tailing be materially reduced by repeated charges of chemicals. If ore is under-roasted, repeated charges may be necessary; but the tailing will be appreciably reduced each time, and ultimately the limit of extraction may be obtained.

An experiment was made in a 100-ton furnace to determine the effect of ultimate roasting on the extraction. The furnace was fired under normal conditions; but instead of treating the ore after its first passage through the furnace, it was returned again and again for 12 hours. It is needless to say that the ore was roasted "dead"; nevertheless, four charges of chemicals on this ore failed to give even the average extraction. It is well known that a particle of pyrite can be almost instantly burned in a highly oxidizing atmosphere. In Denver, some years ago, Gilpin county sulphide ore was roasted in a three-compartment shaft-furnace at the rate of 75 tons per day, giving a thoroughly good roast for chemical treatment. The ore was only 1¾ min. in passing through the furnace. The air (which was pre-heated by a regenerative system and from which the products of combustion were excluded) furnished a highly oxidizing atmosphere surrounding every particle of ore.

It is not so much the high temperature as the lack of air, that is fatal to rapid and thorough roasting in a reverberatory furnace. Fusion of the sulphide particles invariably occurs when the ore is brought too suddenly against a high temperature with insufficient air. The tendency is to convert the sulphide into a matte. Much of the sulphur in the deeper portions of the bed volatilizes as such, and when it reaches the surface it burns to sulphur dioxide. Heat, without access of air, can remove only about 50% of the sulphur originally in the ore.

A highly oxidizing atmosphere is conducive to the formation of sulphates. Air is desirable, but not essential, for their decomposition. Sulphates, as a rule, are not as injurious in the roasted ore as sulphides. Good results have been obtained on Cripple Creek ore having 2.5% sulphur when the soluble sulphur in the roasted ore exceeded 1%. It is the insoluble sulphur which gives trouble, or at least indicates trouble, for when the insoluble sulphur is above the normal the tailing is sure to be high. Sintering or fusing, in the early stages of the roasting, is likely to result in high insoluble sulphur. Ferrous sulphate does not usually form a constituent of the soluble sulphur; it is eliminated before the ore is otherwise sufficiently roasted to give the best results. The soluble and insoluble sulphur (in roasted ore which will give the best results in the subsequent chemical treatment) vary with the composition of the ore.

In order to determine the effects of time and air on roasting and extraction, comparative tests were made with furnaces roasting 100 tons of ore containing about 2.75% sulphur. The ore in furnace No. 1 was roasted under normal conditions; the bed of ore was about 2½ in. deep, the angle of the rabble blades was 22.5°, and the ore was about 2½ hours in passing through the furnace. In furnace No. 2 the angle of the rabbles was changed to 12°, which resulted in having the bed about 4½ in. deep; the ore remained in the furnace about 5 hours to get the same capacity. All the other conditions remained the same, so far as they could be kept the same.

TEST NO. 1.

	Furnace No. 1. 90 Tons per Day.	Furnace No. 2. 90 Tons per Day.
Sulphur, raw ore	2.63%	2.53%
Sulphur, roasted ore:		
Soluble	0.73%	0.94%
Insoluble	0.17%	0.26%
Total	0.90%	1.20%
Assay, roasted ore, gold	1.07 oz.	2.22 oz.
Assay, chlorination tailing	0.09 oz.	0.28 oz.
Extraction	91.5 %	87.4 %

TEST NO. 2.

	Furnace No. 1. 100 Tons per Day.	Furnace No. 2. 70 Tons per Day.
Sulphur, raw ore	2.80%	2.75%
Sulphur, roasted ore:		
Soluble	0.79%	0.72%
Insoluble	0.14%	0.25%
Total	0.93%	0.97%
Assay, roasted ore, gold	1.80 oz.	1.19 oz.
Assay, chlorination tailing	0.12 oz.	0.19 oz.
Extraction	93.30%	85.30%

TEST NO. 3.

	Furnace No. 1. 100 Tons per Day.	Furnace No. 2. 70 Tons per Day.
Sulphur, raw ore	2.62%	2.50%
Sulphur, roasted ore:		
Soluble	0.76%	0.59%
Insoluble	0.14%	0.23%
Total	0.90%	0.82%
Assay, roasted ore, gold	1.90 oz.	1.08 oz.
Assay, chlorination tailing	0.12 oz.	0.29 oz.
Extraction	94.00%	78.00%

In furnace No. 2 it was soon found that a capacity of 100 tons per day was out of the question. The capacity was at once reduced to 70 tons to give, what at least appeared to be, a fair roast. The bed (which with a capacity of 100 tons was about 5 in. deep) with 70 tons was reduced to 4 in. The high tailing in No. 2 may have been due, in a measure, to the higher temperature frequently necessary to eliminate the sparks from the finished ore.

It is evident from these tests (which are characteristic of many others made at the same time) that air is, after all, a factor of the highest importance. By increasing the bed from 2 or 2½ in. to 4 or 5 in. (which makes the penetration of air into the mass of the ore more difficult) the capacity was reduced from 100 to 70 tons per day; and the quality of the roast was very inferior, notwithstanding that the time of roasting was practically doubled. The ore in these tests was crushed to 12 mesh, and chlorinated 3 hours with a chemical charge of 15 lb. of "bleach" and 20 lb. of acid per ton of ore.

According to press dispatches from St. Petersburg, August 1, the Ministry of Finance has summoned a conference of experts and other interested persons to discuss the situation caused by the high price of crude oil, which is of economic importance, owing to its use as fuel. It is proposed to require the payment of a portion of the rent of oil lands in oil, which the Government will be able to sell outside the "combine," and also to open up unexploited oil lands in the possession of the Government.

Awaruite is a natural alloy of nickel and iron, which is found in gold washings in California and Oregon. It contains about 25% iron and 75% nickel.

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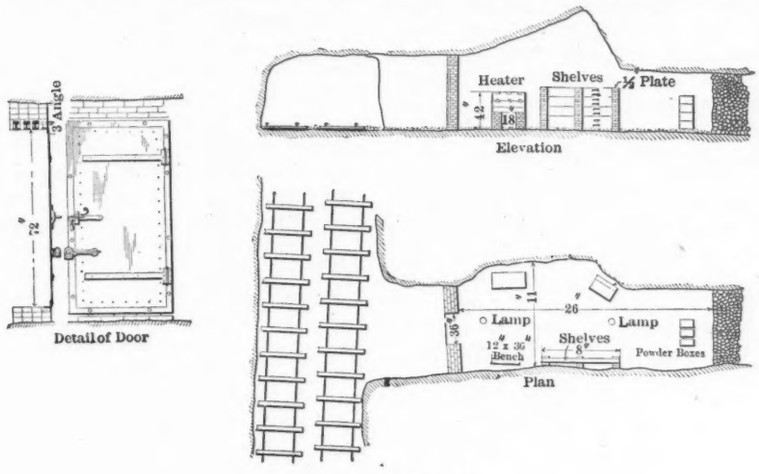
An Underground Magazine and an Electric Powder Thawer.*

BY WILLIAM KELLY.

What is the safest way to take care of and thaw out dynamite in the mines? Is it best to distribute it to the men, one or more boxes at a time, and let them take care of it and thaw it, or to establish a magazine underground where the powder can be thawed, and have the men come there and draw what is required at each blasting time? Whichever system is adopted, there are dangers to be guarded against, and the question is therefore as to the comparative dangers of the different systems. There are mines in which the amount of powder used is so small, or the working places so scattered, as to make a central magazine impracticable, but in other mines it is a proper question to consider. In the hope that this subject may be discussed, the following description of a central underground magazine is offered.



POWDER MAGAZINE.

At the Republic mine in Michigan, a drift on the 1,150 ft. level connects the principal shafts. At a distance of 560 ft. from the nearest shaft there is a crosscut in the foot, leading to a completed stope. A dry stone wall was put up at the end of the crosscut nearest the stope and a brick wall with a steel door built near the outer end, so as to leave a room 26 ft. long, of which 17 ft. is from 8 to 11 ft. wide and 7 to 12 ft. high, while the inner 9 ft. is 7 to 8 ft. wide and 5 to 6 ft. high. The brick wall is 6 to 8 ft. from the main drift, allowing a convenient exterior space.

The brick wall is 16 in. thick, with a door frame on the outer side made of 3-in. angles, anchored to the brick wall by four 0.5-in. bolts on each side. The door is a single plate of 0.5-in. steel, stiffened by 1¼ by 3-in. angles riveted on inside near the edges. The door laps over the door frame an inch in each direction, and is attached to it by two hinges, 2½ by ½ in. A substantial latch of 2½ by ½-in. metal, with handles inside and out, holds the door closed and there is a hasp of 0.5-in. round iron, with staple, for a padlock.

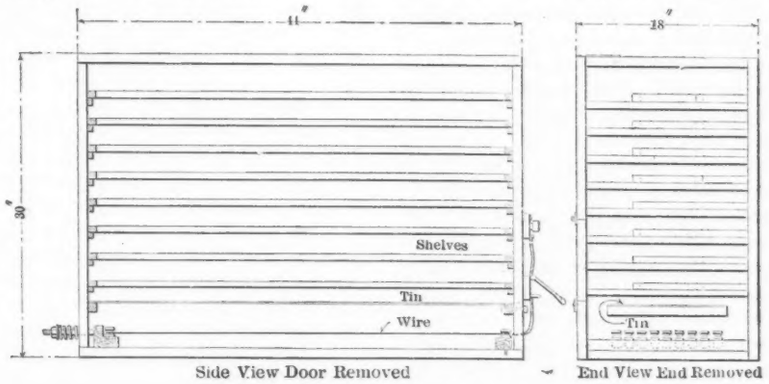
The ground is solid and requires no timber. The nearest timber in the drift is a stull 60 ft. long at a distance of 45 ft. from the crosscut. A concrete floor was put in.

The furniture consists of a powder thawer, described later, which stands on brick piers, a powder rack with four steel shelves on brick piers, a wooden standing desk and a wooden bench. There are two 16-c. p. electric lamps inside, and one in the drift outside. The wires are supported on the customary 1 by 6-in wooden strips.

The powder is sent down once a day, not over 10 boxes at one time. A small platform car, with a rack around it, is used to tram the powder to the magazine. Including the loose powder, there are never at any time more than 12 boxes of powder in the magazine. The average consumption is under 10 boxes a day. The boxes are opened as required, and the powder thawed in the heater. When the powder is soft it is placed on the shelves to be supplied to the miners as called for. The temperature of the magazine in August, when the door is shut, is 54° F. As the freezing point of dynamite is 42° F., there is no necessity for additional heat to keep the powder soft in summer and we do not expect there will be in winter. When the boxes are emptied they are thrown into a tram car, with all the sawdust, and hauled away. The magazine is kept clean. There is a man in charge during each shift, who enters in a note book the amount of powder given out to each miner. The miners are not allowed inside the door. They are obliged to provide themselves with bags in which to carry the powder. When a miner comes to the magazine, he hands his bag to the powder man, who takes it into the magazine and puts into it the number of sticks required. Fuse is kept in the magazine, but no caps.

In order to eliminate all flame from the magazine, some substitute for the old style powder thawers was necessary. As there is no steam within half a mile of the magazine, that source of heat was out of the question. F. G. Armstrong, after some experimenting, devised an electric powder thawer, which has been used with perfect satisfaction.

This consists primarily of a rectangular, wooden box, containing an electric wire, which gives off the heat; together with a metal sheet to prevent anything falling on the wiring, and shelves to hold the powder. The box is made of 1-in. dressed pine, 42 in. long, 16 in. deep and 28 in. high, inside dimensions. The only opening is in front. The door is hinged at the top and is 22 in. deep, leaving the 6 in. along the bottom of the box permanently closed, to prevent meddling with the wiring and to keep out dirt. The door is in two parts, the lower part (6 in. wide) beng hinged to the upper part and folding up against it. On raising the lower part, the lower rows of powder can be examined without losing all the heat in the box.



POWDER THAWER.

A small strip of wood is fastened across the bottom of the box at one end, to which a row of small insulators is securely attached. At the other end the insulators are attached to a corresponding strip of wood, which can be moved horizontally ⅜ in., but is prevented from other motion by cleats at the bottom and end.

A piece of iron wire, No. 24 Birmingham gauge, 50 ft. long, was used. One end of

*Abstract of a paper in *Proceedings* of the Lake Superior Mining Institute, Vol. X.

the wire was fastened to the insulator at one end of the stationary row, and the wire stretched back and forth around the insulators at each end of the box alternately, ending with, and fastened to, the insulator at the other end of the stationary row. The wire was stretched when first put on until it "sang." To take up the expansion of the wire when heated, the movable strip with insulators was held in place by two bolts running loosely through the end of the box, which carry spiral springs under compression. The ends of the iron wire were soldered to No. 14 insulated copper wires; which run through the end of the box to a small knife switch on the outside, and thence to a 10-ampere fuse block.

The wiring in the bottom of the box occupies 10.5 in. of width, leaving 2.75 in. clear on each side. Four and one-half inches from the bottom there is a horizontal sheet of thin metal 12 in. wide to prevent anything falling upon the wiring and causing a short circuit. An air space of 2 in. is left on each side of the sheet metal. A sheet of asbestos covers the bottom of the box.

There are eight rows of shelves above the sheet metal to hold the powder. These are only skeleton frames so as to allow the warm air free circulation. These frames are 7 in. wide, but there are projections on the ends, so that, when pushed in as far as they will go, the strips which hold the powder are in the center of the box. The powder is placed on the shelves and taken off them when they have been drawn out of the box. The current is turned on only when the powder is in the box.

Tests show that the temperature rises about 30° F. the first five minutes, 20° the next, 12° the next and so on, gradually rising less and less until the box loses heat by leakage and radiation as fast as it is furnished. The maximum temperature obtained in this heater was approximately 170° F.

A 60-cycle alternating current at 110 volts is used, 9 to 10 amperes being required for the first two or three seconds. As soon as the wire becomes hot, the heat increases the resistance and only 5.5 amperes are used.

The heater holds 200 sticks of powder, spaced 0.25 in. apart. From one to two hours are required to thaw a heater full, depending on how hard the powder is frozen. The cost of the current is 2.2c. per hour.

H. C. Loudenbeck, in *Trans.* American Foundrymen's Association, June, 1905, 17—19, states that manganese can be used to advantage in low-silicon and chilling iron (a) when the percentage of scrap is large and the sulphur high; (b) when plates having hard-chilled faces and soft backs are desired; and (c) when the amount of sulphur in the iron employed exceeds 0.07 per cent.

Doors in Coal Mines.

Some correspondence on this subject between George Harrison, chief inspector of mines of Ohio, and Assistant Attorney-General W. H. Miller, of the same State, is given below. Mr. Harrison wrote Mr. Miller as follows: Section 301 of the mining laws of Ohio provides that "In all mines, whether they generate firedamp or not, the doors used in assisting or directing ventilation of the mine, shall be so hung or adjusted that they will shut of their own accord and cannot stand open; and all main doors shall have an attendant, whose constant duty shall be to open them for transportation and travel, and prevent them from standing open longer than is necessary for persons or cars to pass through." Since the enactment of this measure a number of new devices have been introduced into the mines with a view of displacing the original wooden doors, the major portion of which operate automatically by the use of simple and substantial machinery connected with the door. A trip rail, with which the wheel of the mine car comes in contact for a safe distance on both sides of the door, opens and holds the door until the trip of cars has passed through, when the machinery again adjusts itself, quickly and effectively closing the door.

While a number of these devices are made of canvas, or other light material, they are very substantial and durable. The ventilating current in the mine is much less interrupted or interfered with in the opening and closing of them than by the use of the old doors and the boy attendant. The danger of serious accidents by trips of cars running into heavy wooden doors, through excitement or negligence on the part of a careless or irresponsible boy in not opening the door at the proper time, is reduced, rather than increased, by the use of a well-arranged automatic door.

All things being considered, inspectors of Ohio are much in favor of such doors in mines, but the question arises, and on which we desire your opinion, is: First—"Is an automatic door, operated by the traveling of mine cars, which are always under control of some engineer, motorman or mule driver, a fulfilment of the requirements of Section 301?"

Second—"If there is technical objection to an automatic door in mines, as provided in Section 301, has the department of mines a right—in the exercise of its discretionary powers, as given in Section 292—to permit the use of automatic doors as main doors in mines?"

Section 292 reads as follows: "The inspector shall exercise a sound discretion in the enforcement of the provisions of this act, and if in any respect (which is not provided against by, or may result from, a rigid enforcement of any express provisions of this chapter) the inspector finds any matter, thing or practice in or connected with any such mine to be dangerous or defective, so as, in his opinion, to threaten or tend to the bodily injury of any person, the inspector may give notice in writing thereof to the owner, agent or manager of the mine, and shall state in such notice the particulars in which he considers such mine, or any part thereof, or any matter, thing or practice to be dangerous or defective, and require the same to be remedied."

Mr. Miller replied as follows: Since receiving this request I have visited one of the principal coal mines of the State, and have seen in operation the automatic doors referred to in your request. While Section 301 provides that an attendant shall be placed at all main doors, it also contains provision that said doors shall be so hung that they will shut of their own accord and cannot stand open, and designates as the duty of the attendant to open those doors for transportation and travel. The automatic doors used are hung so that they will not only shut of their own accord, but also open of their own accord. This being true, where automatic doors are used there exists no necessity for an attendant. The law does not intend a vain thing, and, from my personal observation, I am of the opinion that the automatic doors referred to are so hung that they will open and close of their own accord, and that it is not necessary to place an attendant at said doors to open them. This question, however, rests in the sound discretion of the mine inspector under the provisions above referred to in Section 292, and, if in the sound judgment of the inspector, the automatic door is better adapted for the ventilation of air, and is less liable to injure occupants of the mine, he has the authority to permit their use.

The Beira Railway.

An agreement has been arranged between the Mozambique Company and the Beira Railway Company, with regard to reduced railway rates for goods imported into the Mozambique Company's territory and Rhodesia *via* Beira.

As long ago as September last (1904) it was decided that the rates for goods entering *via* Beira should be reduced; and in the early part of this year the manager of the Beira and Mashonaland railways returned to South Africa to prepare a new tariff, which, after careful consideration and adjustment, has been accepted by the various companies interested.

The new rates (notice of which will be published on receipt of the approval of the Portuguese Government in so far as they relate to the Mozambique Company's territory) are considerably lower than those now in force; the reductions vary, according to the class of goods, from 10% to 35%. The reductions should largely increase the traffic over the Beira Railway, and make Beira the principal port of entry for the whole of Rhodesia.

Cubanite in a Rabble Incrustation.*

BY W. P. HEADDEN.

In the summer of 1903 I received from Anaconda, Montana, a small piece of material which had formed on a rabble or plow of a McDougall furnace.

The material had a dull brassy color, metallic luster and a conchoidal fracture; but, as this portion breaks off in scales, it is difficult to judge whether this was its real fracture or whether this apparently conchoidal fracture was due to the manner in which it had been formed.

The mineral on which this preliminary analysis was made, was too small for a complete analysis; and subsequently Mr. E. P. Mathewson, superintendent, sent me one of the rabble plates, which showed the deposit formed on it by the action of the roasting ore in a most satisfactory manner.

The incrustation on the front edge and corner is about three-eighths of an inch in thickness, and on the ground surface appears to be composed of three layers; the innermost one is at all times easily recognized, but the middle and outermost layers merge into one another.

The innermost layer separates very easily from the iron plate and also from the middle layer.

The innermost layer is dark gray, rather fine granular in structure, with highly reflecting points due to the presence of graphite. It shows no signs of having been fused, is not very hard and is non-magnetic. It gave the following analysis: Sp. gr. at 21° C., 4.0073; insoluble, 10.42%; silica, 1.01%; sulphur, 20.00%; iron, 55.65%; copper, 0.38%; carbon, 6.61%; oxygen, 5.07%; manganese, trace; total, 99.14 per cent.

The middle or second layer has the same fracture that No. 1 has (*i. e.*, fine granular), but it does not show the glistening particles nearly so prominently. Its color inclines to a bronzy yellow. It is harder than No. 1, and is feebly magnetic. Its analysis is as follows: Insoluble, 4.86%; sulphur, 30.80%; iron, 50.75%; copper, 6.18%; zinc, 0.27%; arsenic, manganese, calcium, magnesium, traces; oxygen, 3.56%; carbon, 3.58 per cent.

This sample is clearly a mixture of compounds—at least two. If we neglect the oxygen, it is probably a mixture of FeS (which makes up essentially the whole mass of No. 1) with a little sulphide of copper.

The third or outermost layer is wholly different in color and texture from the others. Its color is a bronzy yellow which tarnishes in peacock tints. Its fracture is conchoidal, and its hardness about equal to that of the middle layer, *i. e.*, less than six. Its analysis is as follows: Sp. gr. at 20° C., 3.9381; insoluble, 6.18%; sulphur, 31.54%; copper, 21.74%; iron, 39.93%; calcium, magnesium, oxygen, carbon, traces; total, 99.39 per cent.

* Abstract of a paper read before the Colorado Scientific Society, June, 1905.

Calculating Cu, S, and Fe to 100%, we have, as shown in the table given herewith:

	Actual Analysis.	Theoretical for Cubanite.
S	33.84%	35.4%
Cu	23.32	23.3
Fe	42.84	41.3
	100.00	100.00

This analysis corresponds fairly well to the formula CuF_2S_4 for cubanite.

These results indicate that the products of the action of the roasting ore upon the iron of the rabble plate is to sulphurize it, converting it into FeS. This is a result which we would expect. If the vapor of sulphur comes into contact with iron, even cast iron, we can easily understand that it would unite with it, forming FeS. It is not so easy to account for the presence of oxygen in the first or innermost layer, but it was present. That the outer coating of the deposit contains oxygen is very probable; it is evident to the eye. If the incrustation has increased in thickness by addition from the outside alone, then a failure to completely reduce this film of oxide might account for the presence of the oxygen. I do not see how this can apply to the innermost layer, No. 1, whose small content of copper as well as its position seems to me to militate against the assumption that the incrustation has increased by additions to the outer surface. The presence of even 0.25% of copper in the innermost layer suggests that it has probably passed through the outer layers to be absorbed in this, by a sort of solid solution.

The occurrence of cubanite, as the outer layer, points to a total rebuilding of the molecules forming the mineral; had it been chalcopyrite, a common ore, it might have been an accident due to the adhering of the chalcopyrite particles to the hot and perhaps softened surface; but the molecule is a new one and the mass has not been formed by agglutination.

Colombia Emerald Mines.

The following paragraphs are taken from the report of Mr. Lloyd-Owen, who was employed by the Colombian Government (from the U. S. Consular Report):

The mines are situated in the state of Boyaca, and are 1½ hours' ride on mule back from the small town of Muzo, which was formerly of considerable importance. Muzo is 2 hours by rail from Bogotá.

The area of emerald-bearing ground is large; it has never been properly explored, but undoubtedly extends over many square leagues of country, the Government property alone, which forms the district around the Muzo mines, being estimated at 40,000 hectares (98,840 acres), of which a large portion is emerald bearing.

The mines have probably been worked for 1,000 years, first by the Indians, then for some 300 years by the Spaniards, and since then by various persons or syndicates under some arrangement with the Colombian government. Most of these leases were for short terms; each party worked the mines to get as many emeralds as possible without regard to the future of the mine. Naturally under this systems the general output of gems was not large, compared with what can be produced with a better mode of working.

Under favorable circumstances, most beautiful deep-green emeralds have been found in small veins, the green color being probably due to the presence of chromium. In other veins the emeralds are found of a light-green color. Again in still other veins no chromium was present, and as a result the crystals are pure white or colored red or yellow by oxide of iron.

The present workings on the Muzo emerald mines are situated near the end of a long, deep valley. In the time of flood, the water washes the débris from the mines down the valley, but in dry weather the débris accumulates and may in time stop the working of the mine. The thickness of the emerald-bearing strata at the present workings of the Muzo mines varies from 100 to 200 ft. Practically all the emeralds are found in the lower strata. This means that immense quantities of barren rock have to be removed in order to get at the emeralds.

As it would not pay to remove such an overburden by hand labor, water is employed. The present system is as follows: A small stream of water is intercepted and caught in a tank; when this tank is full the water is released, and rushing down washes the débris into the valley. This arrangement answers fairly well in wet weather and for working on a small scale only. In order to insure a regular supply of emeralds, it is necessary that the present accumulation of débris be removed.

The production for the period between May 1, 1904, and January 31, 1905, was as follows, stated in carats: First class emeralds, 262,548; second-class, 467,690; third-class, 22,700; fourth-class, 16,000. Total, 768,938 carats.

It will be noted that one-third of the emeralds sent from the mines are considered first-class there; but a considerable proportion of these when examined by an expert are reduced to the second or third class.

It would be a fair estimate to say that 10% of the emeralds sent from the mines are first-class; these in cutting will probably lose one-half their weight. The profits of the Muzo mines for the last ten months' work should not be less than the following: Ten per cent. of the production, 76,893 carats; allow one-half for cutting, 38,446 carats; production, estimated value, £153,784; less wages and other expenses at mines, £10,784; net profit £143,000 ($695,910).

By opening the old workings on the other side of the valley, another profitable mine might be developed.

Coke Drawing Machine.*

BY GEORGE T. WICKES.

Anything which tends to prolong the general use of bee-hive ovens will be welcome to those who are interested in cheapening the cost of producing coke in such ovens, especially if it provides satisfactory mechanical means, replacing the hard labor involved in drawing coke by hand with the old-fashioned "duck-bill." The difficulty of finding efficient coke-drawers, especially during the summer season, and in the South, is notorious.

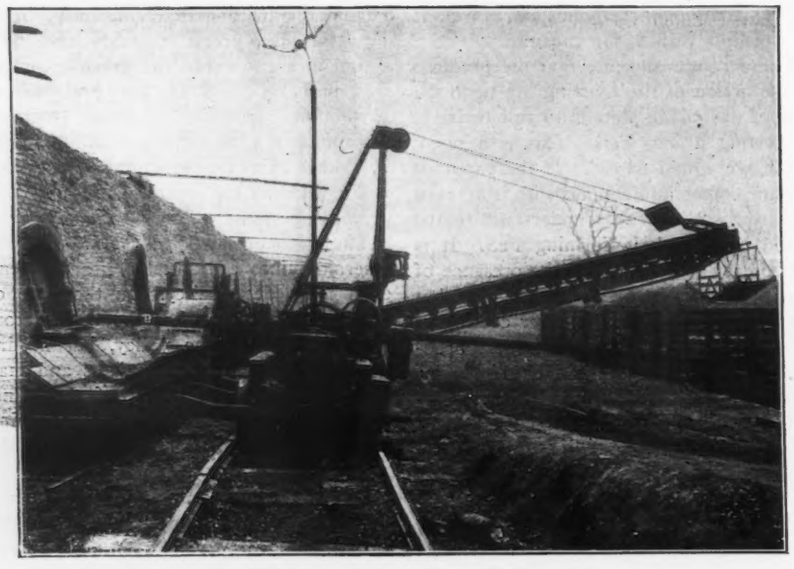


FIG. 1. RIGHT-SIDE VIEW.

The machine here described was put in operation at the Frick Coal & Coke Co.'s plant, known as Continental No. 1, at Uniontown, Pa., in October, 1904. Trial has demonstrated that one equipped with an electric motor, and operated by one man with an assistant, besides two men to "water down" the ovens in advance of the machine, and one man to clean out what little coke may remain in the oven after the machine has finished its work, will, with the aid of the accompanying conveyor, draw more than 30 ovens per day of 10 hours and load the coke on cars for shipment.

Possibly not every one will agree with me in advocating deep charges as against shallow ones, but to those who believe that the loss in fixed carbon is smaller in the deep charge, the advantage of the machine over hand-drawing must be apparent; since no charge is too deep to prevent the machine from drawing it with ease. Therefore, the economical charge for a given oven may be fixed and determined by the operator without regard to time required or the fatigue experienced by a man drawing coke by hand.

Inasmuch as an oven can be drawn in not more than 20 min. (a record of 10 min. has been attained), provided the ovens are immediately re-charged, there is a substantial saving in heat conserved in the oven and in the time employed in burning off the charge of coke, in addition to the saving of approximately one-half the cost of hand-work in drawing and loading.

Figs. 1, 2, 3 and 4 show the machine ready for operation in front of a row of ovens. It operates smoothly, can be driven by steam or electricity, is capable of withstanding hard usage, and is compact and simple. The well-braced frame of iron, cast in one piece, is supported on a four-wheel truck. With the frame are the necessary heavy cut-steel gearings, operating a steel ram, equipped at its extremity with a chilled cast-iron shovel, thin at the front and 6 in. thick at the back, which is forced in under the coke to the back of the oven. By reversing the gearing, the shovel is withdrawn with its lode of coke. The motor is of the street-railway type, simple and easily operated. The machine can be moved forward or backward on its track and the carriage can be revolved on a central axis, which allows the ram to be introduced into the oven at any angle.

In operation, the central portion of the coke is drawn first, and then the ram-carriage is swung so as to draw the coke on either side. Although it is possible to reach any part of the oven, there will always remain a small quantity of coke, which is best removed by a man following the machine, who also puts the oven in shape to receive a new charge. The coke, when drawn, falls on the conveyor, which is carried on a separate truck, and with a spearate motor, and is so equipped as to screen the coke during travel, and deliver it into a railroad car for shipment. The quality of the coke is as good and as free from breakage as that drawn and loaded by hand.

There are in addition the following advantages:

(1) The ovens are watered in advance of the machine by men who do nothing else, and who therefore can be trained to use only sufficient water to accomplish the desired result. They do not have to consider the heat which the hand-drawer must needs face; and the foreman can accurately determine the amount of spraying to insure the minimum amount of water required to deaden the coke. Excessive watering causes a loss of heat and produces black ends; and use of the machine ought, in this respect, to produce much better results than hand-drawing.

(2) After the machine has extracted the coke, provided the ovens are immediately put into shape for re-charging, the promptness with which ignition takes place is apparent to even the most casual observer, and is in strong contrast to the action of ovens which have been drawn by hand and exposed for 2 to 3 h., or more, to the air.

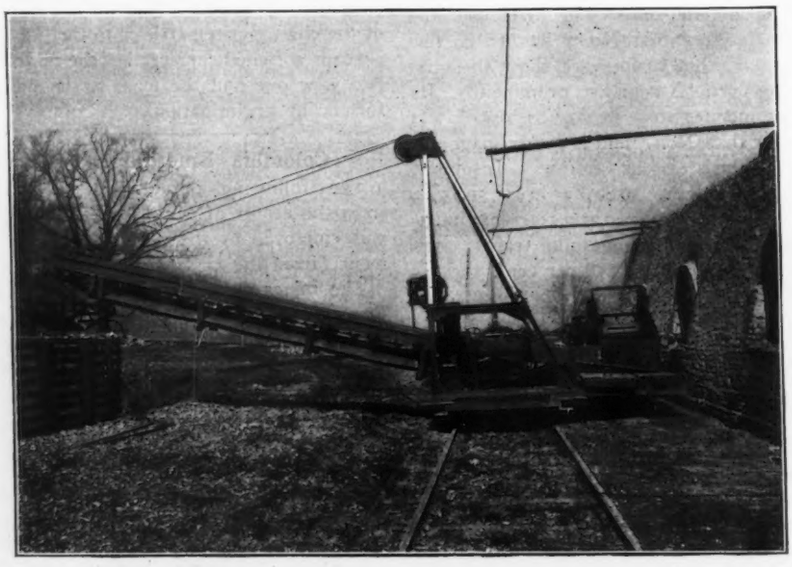


FIG. 2. LEFT-SIDE VIEW.

*Abstract of a paper read before the Am. Inst. Min. Eng., at the Washington meeting, May, 1905.

One hour is ample to remove the coke from three ovens and put them in shape for the next charge.

A test recently made by M. R. Berry, of the West Penn Electric Co., of Connellsville, Pa., on four ovens drawn consecutively, showed that the average time of drawing was 16 minutes. The cost for power was 7c. per oven. There was required the labor of one engineer at $2.25 per day for drawing 30 ovens, 7.5c. per oven; the helper on the lorry at $1.60 per day, 5.33c. per oven; two hose-men for watering ovens ahead of machine at $1.60 each, 10.66c. per oven; one utility man and helper at $1.60 and $1.40, respectively, 10c. per oven; a total of 40.5c. per oven. Making proper allowance for interest, depreciation and maintenance, the total operating cost per oven would be 42 cents.

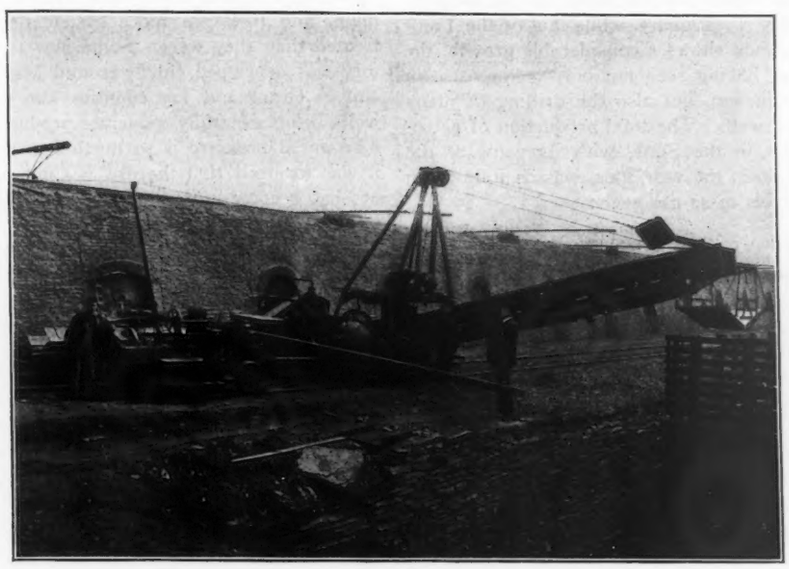


FIG. 3. MACHINE IN POSITION.

Before the introduction of this machine, the average cost of drawing ovens varied from 75c. to $1.15 per oven, depending on the location and conditions, with an average figure of 92c. per oven.

The test showed an average power demand for the extractor of 5.1 kw., for the extractor arm 8.5 kw., while shifting the machine from one oven to another.

A paper on the subject of stamp mill driving by electricity was read by H. J. S. Heathen before a recent meeting of the South African Association of Mining Engineers. He advocated the employment of a very low frequency for power work with a separate high-frequency system for lighting. For driving stamps, he suggested using a motor of 250 r. p. m., with an overhung pulley at each end to drive either 5 to 10 stamps. A 1,350-lb. mill took almost exactly 2½ h.p. per stamp, and a 30-h.p. motor would, therefore, be required for every 10 stamps. By adopting these small motors instead of one or two large ones, the capital expenditure could be reduced 20 to 30 per cent.

Suction Gas Producers.

BY OSKAR NAGEL.

Suction gas-producer plants more and more are being introduced, and with great success, in this country on account of their simple working and economy in running and maintenance. They are used in connection with a gas engine, for power for all kinds of industries and shops. Such a suction gas producer is working successfully in the machine shop of the F. W. Horstmann Company, East Newark, N. J. This shop was formerly using illuminating gas, in connection with a gas engine. The plant (built by me) is working according to the guarantee given—that is, the development of 1 b.h.p.-hour from 1¼ lb. of anthracite (pea) on full load; 1⅓ lb. on ¾ load, and 1½ lb. on ½ load. The plant has a capacity of 20 h.p. It consists of a hand-blower, a producer with evaporator on top of the same and a scrubber. The overflow water-pot which belongs to the plant is in a pit between the producer and the scrubber; a small equalizing tank is connected on the floor below to the engine so as to connect the scrubber with the engine.

By the sucking action of the engine, air is drawn over the surface of hot water in a water-jacket and saturated with steam; this saturated mixture of steam and air is drawn through the fuel whereby the producer gas is generated. From the producer the gas goes through the scrubber, which is filled with coke, where it is freed from dust and tar by means of water. From the scrubber the gas goes through the equalizer (which is a simple iron drum) to the engine.

This plant is provided with a hopper which is large enough to contain fuel for a working-day. Thus no refilling of coal is required during the working hours. After shutting down for the night, the lower door is kept partly open, and also the valve leading to the flue, so as to keep up a little draft and maintain the fire. In the morning before starting up, the fire is cleaned from ashes and the hopper is filled with coal; then the fire is blown hot for 10 or 15 minutes, by means of a hand-blower, and until the gas is burning well at the test cock; then the engine is started as usual. During the working day the plant does not require any attention, except cleaning the grate once or twice.

A similar plant of the same make is working at the elevator of the Stockbridge Elevator Company, Stockbridge, Mich., and is operating successfully on a changing load. This plant used, until a short time ago, a gasolene engine for developing its power; now it has installed this producer. The saving is such that the first cost of the plant is recovered in less than one year.

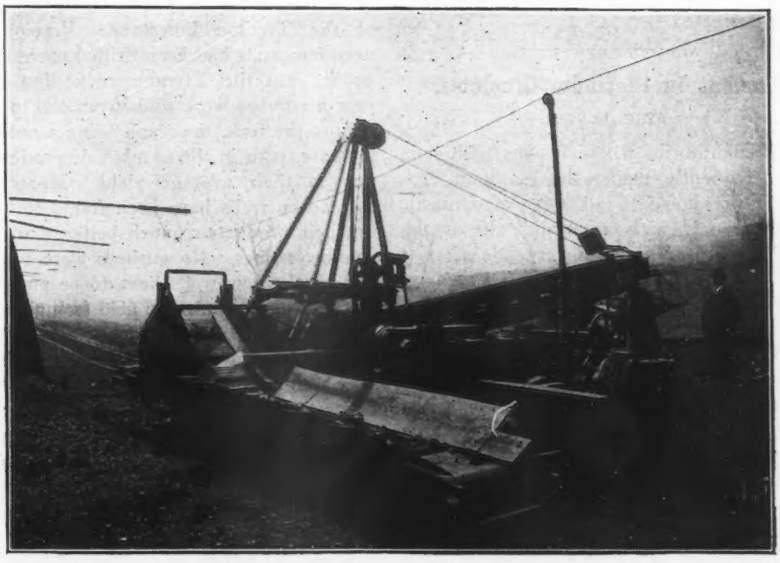


FIG. 4. CONVEYOR END.

Gasoline Pumps for Irrigation.

E. A. Moritz, of the United States Reclamation Service, has just completed a series of tests at Garden City, Kan., the results of which will be considered the basis for making improvements on the present plans for irrigating western country. A new irrigating plant installed by I. L. Diesem, of Garden City, was used for testing purposes.

The water came from two 16-in. wells, placed 20 ft. apart. The wells are 45 ft. deep and have, at the bottom, 14 ft. of 18 in. strainer, above which there is placed 11 ft. of 16 in. strainer. The water stands in these wells naturally about 10 to 20 ft. below the ground. A 10-h.-p. gasoline engine made by the Witte Iron Works Co., of Kansas City, Mo., driving a No. 4 centrifugal pump was used.

A careful determination of the amount of water pumped was made. The pump discharge was 363 gal. per min. and the natural level of water in the well was lowered 6 ft. 9 inches. The gasoline used amounted to about 1 gal. per hour. At this rate of consumption the cost of fuel amounted to 12c. per hour, which corresponds to a cost of gasoline of about $1.76 for each acre of land covered with water 1 ft. deep. If allowance be made for repairs, cost of oil, and other supplies, as well as for interest on the money invested in the plant, the total cost of water would probably not exceed $2.71 per acre foot.

The highest record made was on July 24, when 5 acres were covered in 7 hours pumping. During the last test only 1⅓ in. of water was used on the land. The amount of gasoline consumed cost about 18c. an acre; including all charges, the cost probably did not exceed $0.27 per acre irrigated.

Fusions in Platinum Crucibles.*

BY C. BENDER.

In laboratories where fusions with soda are frequently made, the platinum crucibles are liable to all sorts of fantastic shapes; only with great difficulty is the melt separated from the crucible after it has been used several times.

This adhering of the cold melt is due to the surface of the platinum being attacked and slightly roughened. It occurs only after the third or fourth fusion, when the inner wall and the bottom of the crucible have lost their bright metallic luster. If the crucible is cleaned after every three or four fusions, first with moist, then with dry, sea sand, until it shows a bright metallic luster, the melt will drop off of its own accord on cooling. Even from old and much-distorted crucibles, the melt will separate readily with this treatment, the result of which amply repays the few minutes spent on it.

*Translation from *Zeit. f. angew. Chem.*, 1905, No. 26, p. 1025.

Indiana Petroleum.

The petroleum fields of Indiana are classed by State Geologist W. S. Blatchley in three groups—the Trenton rock field, the Corniferous rock and the Huron sandstone. Of these, the Trenton rock field is by far the more important, having produced last year 99.5% of all the petroleum reported for the State, Moreover, the output of the wells in the smaller fields is stationary, while that of the Trenton field shows a considerable growth, the year having seen not only an increase in production, but also the drilling of many new wells. The total production of petroleum in the State, with its value at the wells, in the year 1904, was as follows, in barrels of 42 gal. each:

	Barrels.	Value.	Per Bbl.
Trenton rock.....	11,281,030	$12,127,107	$1.0750
Corniferous rock..	18,103	21,040	1.1622
Huron sandstone..	32,207	28,733	0.8921
Total	11,331,340	$12,176,880	$1 0746

This was an increase of 2,114,062 barrels, or 22.9%, as compared with 1903. Part of the gain was due directly to the opening of new wells, and part to the fair average price realized, which brought sufficient return to the operators to induce the steady working of pumping wells. The total number of new wells drilled in the Trenton rock was 3,724 during the year. Of these, 3,341 were producers, and 383 were dry holes; the proportion of dry holes, or failures, being 10.2% of the total. The total initial daily production of these new wells was about 62,140 bbl., an average of 18.6 bbl. to the well. A count made in October showed 14,440 producing wells in the State.

The most important event of the year was the discovery in the Muncie-Parker-Selma field, in Delaware and Randolph counties, that a second, or third, pay streak occurs from 240 to 300 ft. below the top of the Trenton limestone. Previously, very few wells had been drilled more than 90 ft. into the Trenton rock; but last year a number were sunk from 280 to 320 ft. into the rock, the result being a notable increase, both in the number of producers and in their average yield. Moreover, these deep wells have been found to keep up their production much better than the shallower ones. No gushers were found, and all the new wells have to be pumped.

The Huron sandstone field is limited to the district around Princeton in Gibson county, the few wells near Loogootee having been practically abandoned. In the Princeton district 50 wells were sunk; at the close of the year there were 45 producing oil, 8 yielding gas and 13 dry holes. Most of the wells are small producers, the average being less than 5 bbl. daily. The oil is darker and thicker than the Trenton oil, registering about 31° Beaumé.

The Corniferous rock oil comes from two districts, one near Terre Haute, where there are now only two wells, with declining production. The other district is in Jasper county, and its output is not increasing. This petroleum is a heavy oil, with an asphaltum base. Most of that produced was sold to the Indian Asphalt Company, which has a refinery at Asphaltum, in Jasper county.

The total value of natural gas produced in Indiana in 1904 was $3,027,106. While the output is now much less than it was formerly, the production is still profitable. Many wells have been abandoned, but more care is taken of those which remain, and they are more systematically treated than they were. Some new territory was developed, chiefly around Marion and in Grant and Jay counties, the new wells being generally moderate producers. The initial pressure is so much less than it was formerly that the use of compressors has become quite common where gas is piped for any considerable distance.

The consumption of gas did not decrease last year as much as in 1903. There is much less waste of gas than formerly, chiefly because the pressure is generally lower. The gas inspector urges that owners of wells who abandon them be compelled to plug them properly. If this is not done, the old bores serve to introduce water into the gas or oil rock, to the great injury of producers in the neighborhood. There is a law requiring wells to be plugged when abandoned, but no means are provided for enforcing its provisions.

The Chemistry of Ore Deposits.

Double decomposition, in reaction between salts which would usually be supposed to be largely independent of each other, has been investigated by E. C. Sullivan, of the United States Geological Survey (see *Jour. Am. Chem. Soc.*, August, 1905, p. 976), in a short paper entitled "The Chemistry of Ore Deposition." He finds that there is a distinct reaction between silicates (such as feldspar, shale, kaolin, etc.) and soluble metal salts, as copper sulphate. The exchange is chiefly between the alkali and alkali-earth bases (which leave the feldspar and go into solution) and the copper which is precipitated in the silicate. Also a certain quantity of SO_4 is precipitated with the copper. Mr. Sullivan states that:

"The sum of the bases which go into solution is exactly equivalent to the total copper precipitated, less the sulphuric anhydride precipitated."

Also "the equilibrium actually attainable is decidedly dependent on the grinding; the finer the powder the more copper is precipitated. The action thus apparently takes place only on the surface of the particles."

In one case shale removed 95%; in another case all the copper from solution (which remained perfectly neutral) the oxides of potassium, magnesium, calcium, sodium and manganese replacing the copper.

In the case of the feldspar, 25 grams of the powder will remove from 60 to 100 mg. of copper, out of 50 c.c. cupric sulphate containing 126 mg. copper.

Cyaniding Silver-Gold Ore, Palmarejo.*

BY T. H. OXNAM.†

The predominating value of the ore now treated by the Palmarejo & Mexican Gold Fields, Ltd., is silver. The method consists of wet-crushing and concentrating, followed by cyanidation of the unroasted sand and slime.

The Palmarejo mines are located in the southwestern part of Chihuahua, on the foothills of the Sierra Madre, and at an elevation of 3,200 ft. The mills, 12 miles distant, are situated on the Chinipas river, near the town of Chinipas, which is 150 miles northeast of Agiabampo, on the Gulf of California. Supplies are shipped via this port.

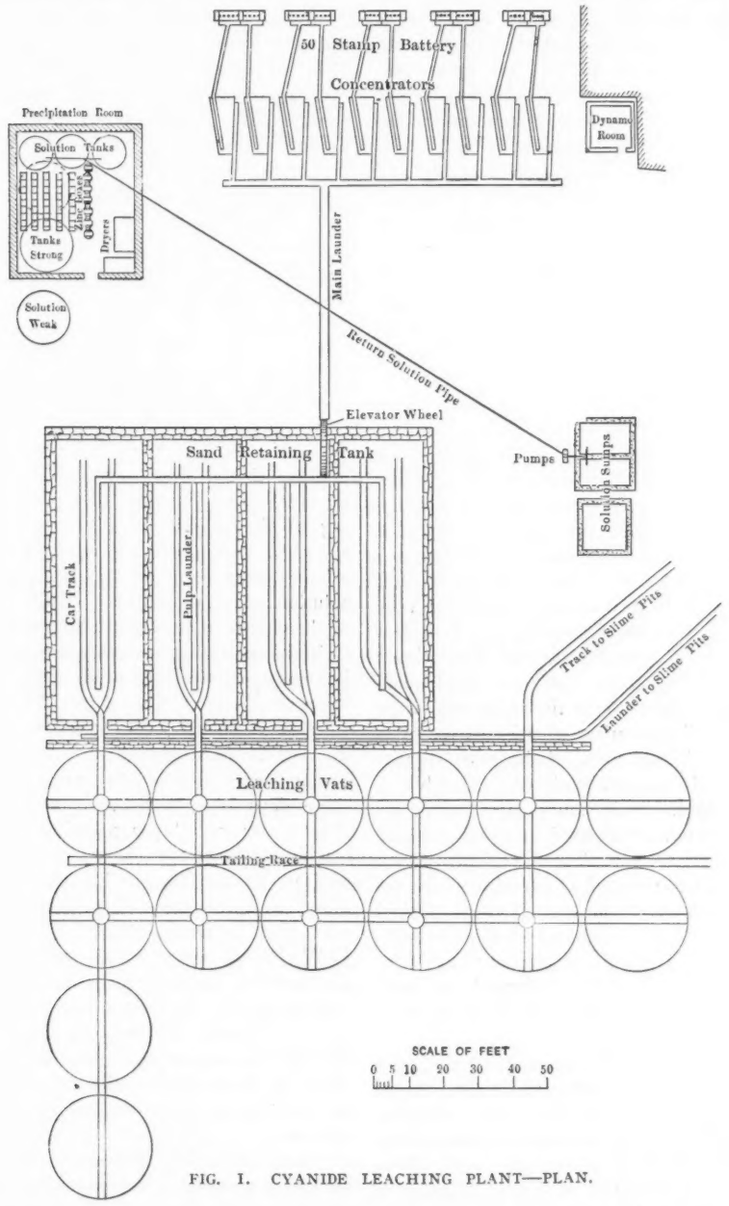


FIG. I. CYANIDE LEACHING PLANT—PLAN.

Mill and Cyanide-Plant.—The 50-stamp mill and cyanide plant are situated on the Chinipas river, 1.5 miles east of Chinipas, at a place known locally as "El Zapote." Water-power, furnished by the river, is used to run the mill, slime-plant and machine-shop. A masonry conduit 11 miles long conducts the water to a pen-stock a short distance above the mill, thence through a steel pipe, 1,100 ft. long, tapering from 48 in. in diameter at the pen-stock to 22 in. at the wheel-pits; here there are four 6-ft. Pelton wheels under a 97.5-ft. head.

The ore consists essentially of a silicious matrix in which is disseminated a small percentage of pyrite. Black manganese oxide, and calcite, are present in varying proportions, and small quantities of antimony and arsenic, together with traces of bismuth, also occur. Occasional traces of copper and zinc are found. The major portion of the silver occurs in the form of argentite, though a certain amount of stephanite is present and occasionally small patches of chlorobromide and native silver.

System of Milling.—The ore, averaging 6% moisture, is brought to the mill in trains of from 9 to 14 cars, and is dumped into the main upper storage-bin, which has a capacity of 1,100 tons. From this, the ore is drawn over 3.5 by 10-ft. iron grizzlies having 1.5-in. openings to the 7 by 10-in. Blake rock-crushers, which run at 250 r. p. m. and crush to 2-in. size. Of the dump-ore, which is coarse and extremely hard, approximately 90% goes to the crushers; of the mine-ore, which is finer and softer, approximately 50% goes to the crushers, the other 10 and 50%, respectively, falling through the grizzlies.

A secondary storage-bin (of 1,100-ton) receives the ore from both grizzlies and crushers. The ore is then trammed to three small intermediate bins, each of 50-tons' capacity; from here it is conveyed, by means of half-ton cars, to the hoppers of the Challenge ore-feeders. This double handling of the ore is inconvenient, but is rendered necessary because of the construction of the mill, which was originally erected for different requirements.

The stamps, when equipped with new shoes, weigh 850 lb. They drop 6 to 7 in., 100 times per min., the order of drop being 1—3—5—2—4; 20-mesh brass-wire screen, No. 26 wire, is used; the height of discharge is kept at 2 in. The stamp-duty is from 2.75 to 3.25 tons per 24 hours. The average stamp-duty would doubtless be somewhat increased by the installation of narrow mortars of the Homestake pattern. For some time past, forged-steel shoes have been used in preference to the cast-iron shoes of our own make. The steel shoes cost 15c. per ton of ore crushed, as compared with 18c. for the cast-iron shoes. We cast all our own dies, for which purpose the worn-out shoes and iron and steel scrap are employed. The average life of a forged-steel shoe is 95 days, while that of a cast-iron die is 33 days.

From the batteries, the pulp passes directly over 10 Wilfley concentrators, running with a 7/8-in. stroke at 215 strokes per min. During the year ending July 1, 1904, the concentrator saved 0.76% by weight of the ore as a product which contained 18.28% of the gold and 17.98% of the silver of the ore.

A wooden launder conveys the pulp from the tables to the tailing elevator-wheel. The latter is 14 ft. in diameter and is of the outside-bucket type, having 22 steel buckets (each 18 in. long, 8.5 in. wide and 8.5 in. deep, with a capacity of 1,025 cu. in.). The wheel is driven by a 5/8-in. plow-steel wire-cable, at a speed of 18 r. p. m. The discharge-efficiency, as in all wheels of this type, is not high, the tailing leaving the wheel in a launder 5.5 ft. above the level of the mill-launder supplying the pulp.

A large masonry sand-retaining tank

*Abstract of paper read at Washington meeting, May, 1905, Am. Inst. Min. Eng.

†Mining Engineer, Palmarejo & Mexican Gold Fields, Ltd., Chinipas, Chihuahua, Mexico.

(divided into four compartments, each compartment measuring 25 ft. by 80 ft. by 4 ft. in depth) receives the product from the wheel. Distribution is effected by a central launder in each compartment, provided with a number of 4-in. side-discharge pipes. Each compartment is provided with a removable end-discharge gate, 4 ft. wide, composed of pieces of 2-in. plank, planed smooth on the edges and sliding in guides secured to the side posts. As the compartment fills up with sand, the discharge of these gates is raised. The discharge-overflow empties into the main slime-launder. Each compartment also communicates with its immediate neighbors by small side-discharge doors. The purpose of this arrangement is that the mill-product may be emptying into one compartment, from which a portion of the finer material escapes through one of the side gates to an adjoining compartment, while the finest material is passing off in the discharge over the lowered end-gate of this second compartment.

It is found, however, that a considerable quantity of the finest material will always tend to collect at the lower end of the first compartment, receiving the discharge of the elevator-wheel, to lessen which an overflow from the end-gate of this compartment is also necessary. The first 5 or 6 tons of material removed from the compartments is always slimy, and is trammed a short distance to an open drying-patio, where it is spread out, sun-dried and broken up; after this it is mixed in with the coarser sand and treated in the leaching-vats. A third compartment of the sand-retaining tank is kept full of sand, which is being drained while the dry sand is trammed from the fourth compartment. Each of these compartments holds the sand of 48 to 60 hours' crushing in the mill. The retained sand is usually subjected to 2 days' draining before charging it into the leaching vats. The fine material escaping in the overflow from the masonry retaining-tank is carried by a wooden launder to three so-called "slime pits," having an aggregate capacity of 15,000 tons. Every precaution is exercised that no slime escapes at the overflow gates of these pits; but at no time is such overflow perfectly free from suspended matter. During the 18 months (ending December 31, 1904) of the total net tonnage crushed in the mill, 19.16% went to the slime pits. Sizing tests (using the ordinary brass-wire assay screens) have shown that about 6% of this material is retained on the 100 mesh, while 85% passes a 200-mesh screen.

Although this material is chiefly slime (which on long drying cracks up into layers almost impervious to leaching), yet it is found that considerable fine, but leachable, sand is deposited at the head of the slime pits and near the discharge from the slime launder. About two months after ceasing to discharge into any one slime pit, this fine sand at the head of the pits dries sufficiently (during ordinary weather) to permit of being walked on; it is then conveyed, by contract labor, to the open drying floor, or patio, together with a certain percentage of more slimy material which unavoidably becomes mixed with it. Here it is spread out, sun-dried and thoroughly broken up, after which it is mixed in with the ordinary sand and treated by leaching. During the past year (1904) 2,400 tons of very fine material from the slime pits has been so treated. By far the greater portion of the material collected in the slime pits, however, is so extremely fine and has such a clayey nature that it is almost impervious to leaching. This portion, slime, is allowed to dry as much as practicable, and is then treated by agitation in a separate plant, as will be described further on in this paper. Figs. 1 and 2 show the arrangement of the cyanide leaching plant.

Cyanidation of Sand.—The sand caught in the large masonry sand-retaining tank (after being allowed to drain as long as possible, usually from 36 to 48 hours) is trammed in half-ton cars to the cyanide leaching vats; these are 12 in number, 30 ft. in diameter and 4.5 ft. deep. The filter bottom (which reduces the available depth to 4 ft. 2 in.) consists of a wooden, lattice framework, covered by a layer of cocoa matting, over which is stretched a filter cloth of 8-oz. duck. Two heavier grades of duck have been tried, but they reduced the rate of leaching and gave less satisfactory service than the 8-oz. cloth; 10 of the leaching vats are constructed of No. 9 sheet steel; the other two were built on the premises of 3-in. native pine. Two additional vats, of the same dimensions and capacity, made of 3-in. redwood throughout, are in course of erection.

The sand, as charged into the leaching vats, carries 14 to 16% of moisture; each vat holds 100 ton of dry sand. While being trammed to the leaching vats, slaked lime is added to each car, and in the proportion of 4 to 5 lb. of lime per ton. The vats are filled and discharged by contract, for $19 a vat, equivalent to $0.19 per ton.

Two stock solutions are employed: the weak, of 0.25 to 0.30% KCN; the strong, of 0.75 to 0.80% KCN. The working strength of the solutions is always taken as that indicated by titration with silver nitrate (in presence of a few drops of a 10% solution of potassium iodide, as an indicator), 10 c.c. of the cyanide solution being taken for titration. For convenience, we still express the strength of our working solutions in terms of potassium cyanide, although for over a year past we have been employing sodium cyanide exclusively. Titration with silver nitrate shows that the sodium cyanide used is equivalent to about 125% of potassium cyanide. Our experience with sodium cyanide leads us to believe that it is fully as efficient as potassium cyanide. It also appears that, since commencing the exclusive use of sodium cyanide, our solutions become less fouled than previously. By the adoption of sodium cyanide a saving of 20% of the freighting expense on this article has been effected. Besides the saving in transportation expenses, the sodium cyanide appears to possess other advantages. Other things being equal, it would seem preferable to use a salt as pure as can be obtained. Absolutely pure sodium cyanide is equivalent to about 132% of potassium cyanide; a product, testing from 125 to 130% of potassium cyanide, is nearly pure. It by no means follows, however, that the ordinary commercial cyanide, rated as 98 to 99% pure, contains but 1 to 2% of impurities. That this commercial cyanide frequently carries a varying percentage of sodium cyanide is a well-known fact; and it of course naturally follows that the greater the percentage of sodium cyanide contained in the ordinary 98 to 99% potassium cyanide, the greater the percentage of impurities.

As soon as a vat is charged, from 20 to 25 tons of weak solution (carrying, as just stated, from 0.25 to 0.30% of KCN) is introduced, from the bottom, by means of a 2-in. drop-pipe, terminating in a T underneath the filter. This solution is introduced slowly in order to avoid channeling of the charge; it usually makes its appearance on top of the sand about 6 or 7 hours after being turned on. When the solution stands 2 or 3 in. above the top of the charge, it is turned off, and the material is allowed to soak for 6 hours, during which time the sand will usually have settled from 3 to 4 in. The weak-solution discharge-valve at the bottom of the vat is now opened and leaching is commenced. During the next two or three days weak solution is added from the top, as rapidly as permitted, by the leaching rate of the charge, until a total of from 100 to 130 tons has been applied. From 60 to 70 tons of strong solution, averaging between 0.75 and 0.80% of KCN, is now run through the charge at a somewhat slower rate, the usual time consumed by this operation being 48 hours. Weak solution is next run through the charge as rapidly as possible, until 24 hours before the time it is to be discharged; then wash-water, to the amount of 15 to 20 tons, is added in lots of 5 tons each. The residue is then ready for sluicing, which is accomplished by two men in about 6 hours, each using a 2-in. hose, equipped with a 0.5-in. nozzle and operating under a head of 72 ft. After finishing the sluicing, the canvas filter is usually swept clean with a broom; if this is not done, it is found that the filter cloth clogs with fine slime and the rate of filtration is lowered. Each vat is equipped with two 10-in. by 10-in. square bottom-discharge doors.

The quantity of wash-water used is regulated by the balance of the solutions on hand. Although a separate zinc-box is

provided for waste solution, it is seldom used except during the rainy season; during other parts of the year but little solution is run to waste. Only two of the leaching-vats are under cover, and during the rainy season it becomes necessary to run a certain percentage of the solution to waste; each heavy rain gives the exposed vats a very appreciable quantity of water.

It has been my experience that thorough oxygenation of the material is a very desirable feature in the cyanidation of gold ores; in the case of the Palmarejo ores, this is essential to obtain the best results. Due to the fact that the major portion of the value is in silver, the actual weight of fine metal to be acted upon is much greater than is ordinarily the case with gold ores.

In order to permit as much air to be supplied to the sand as possible during treatment, the solution is frequently allowed to drain down several inches beneath the surface of the charge; air is thus allowed to penetrate the material to this depth. It is our custom to assay each charge every 24 hours, after the first 5 days of treatment. Before each sampling, the solution is allowed to drain down several inches below the surface of the sand, thus allowing additional opportunity for the entrance of air into the upper layer of the charge.

Under the most favorable conditions, however, the air drawn into the top layer can have but little effect on the lower half. It is doubtless due to this difference in aeration of the upper and lower portions that the lower half of the tailing will run from 1 to 2 oz. of silver higher than the upper half. Frequently this difference is even more marked, a variation of 3 or 4 oz. being obtained between the upper foot and the bottom foot of the residue.

To overcome this, and after many experiments, some time ago the practice was adopted of transferring as many charges as possible from one vat to another during the treatment. To transfer a vat means the loss of practically 24 hours of its available leaching time, because it is necessary to drain the charge for 12 hours before commencing to transfer it. Also, it is necessary that one of the adjoining vats be empty at the proper time to receive the transferred charge. By careful manipulation, at present about one-third of the total number of charges treated are transferred. When the two additional vats, now in course of erection, shall be completed, a greater number of charges can be transferred and the additional capacity afforded will also permit of a longer treatment to offset the time lost in transferral. The transferring is done by contract for $16 a vat, which is equal to 16c. per ton. While being transferred, the material is of course given a thorough exposure to the air; any existing lumps are broken up by the shoveling, and, roughly speaking, the bottom layer of the original charge becomes the top layer of the transferred charge. Operations are usually so timed that the transfer takes place while the strong solution is in contact with the material. During the transfer, 100 lb. of slaked lime are evenly distributed near the bottom of the vat receiving the transferred charge.

The charge is sampled just before, and just after, transferral, the latter sample being 1 oz. higher in silver than the former, a result doubtless due to the fact that the tendency is to obtain a larger percentage of the top half of the charge than of the lower half; and, as heretofore mentioned, the lower half of the original charge, after the transferral, becomes practically the upper half of the transferred charge.

The first solution added after the transfer is introduced slowly from the bottom, after which the regular routine treatment is continued. The value of the effluent solution from a charge is found to increase immediately after the charge has been transferred, such increase being usually from 2 to 3 oz. of silver per ton of solution.

In general, all head- and tailing-samples of the sand are taken with a 1.5-in. auger at 12 to 18 different points.

The record of a single charge, which is representative of what is regularly obtained in ordinary operations, is as follows:

Extraction, 96.27% of gold and 53.21% of silver.
Total time of treatment, including charging and discharging, 11 days.
Solution added: Weak, 261; strong, 64; wash-water, 15; total, 340 tons.
All tailing-samples, with the exception of the discharged tailing, were washed before assaying.
During transferral a sample taken from upper 18 in. of charge assayed: $0.50 of gold, 9.20 oz. of silver, and one from the lower 18 in. of charge assayed $0.82 of gold and 11.92 oz. of silver.

The effluent solution from the leaching-vats is carried to the sump-tanks by two separate lines, one for the weak, the other for the strong solution. These tanks are of masonry and are three in number. Two of them (having a combined capacity of 65 tons) are connected and serve as a weak-solution sump; the other, having a capacity of 25 tons, is used for the strong solution. All solution draining from the leaching-vats is passed through the zinc-boxes before being returned to the vats.

The proper tonnage of strong solution is maintained by determining the strength of the effluent solution from the leaching-vats; when this strength reaches 0.35% of KCN, the solution is turned into the strong-solution sump. As a working guide for maintaining the proper alkalinity of stock solutions, they are titrated every day with the addition of about 5 c.c. of strong lime-water; 10 c.c. of cyanide solution is used in all titrations. If the addition of lime-water causes a difference of more than 0.5 lb. in the indicated strength of the solution, the quantity of lime added to the sand charged into the leaching-vats is increased.

From the sump, the solution is elevated by a 3-in. centrifugal pump (900 rev. per min.), to three storage-tanks at the head of the zinc-boxes, a vertical distance of 29 ft. and a horizontal distance of 150 ft. These tanks are each 10 ft. in diam., 8 ft. deep, and have a capacity of 19 tons. Two of these tanks are used for the weak, and one for the strong solution. The solution from the vats now passes through the zinc-boxes, from which it is led to three storage-solution tanks beneath the boxes. These storage-tanks are made of No. 9 sheet steel, each being 15 ft. in diam., 6 ft. deep, and with a capacity of 33 tons. Two of them are used as strong-solution storage-tanks; the other, as a weak-solution storage-tank. The strong solution is brought to the required strength by adding cyanide to the last compartment of the strong-solution zinc-box, which is reserved for this purpose. No cyanide is added directly to the weak solution.

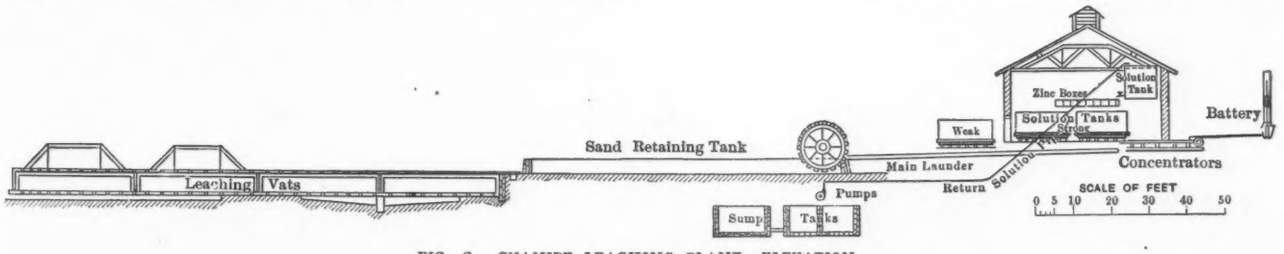


FIG. 2. CYANIDE LEACHING PLANT—ELEVATION.

A simple and somewhat novel application of induced mechanical draft, which is giving excellent satisfaction, is that recently made for the Cleveland Paper Manufacturing Co., Cleveland, O. A special engine-driven fan was installed to produce draft for two horizontal return tubular boilers of 200 h.p. each, to force the combustion products under two other boilers which serve as feed-water heaters or economizers.

New Coal Developments in Northern New Mexico.

BY EMERSON W. JUDD.

Having acquired the property of the Raton Coal & Coke Co. in Northern New Mexico, the St. Louis, Rocky Mountain & Pacific Co., which was incorporated in New Mexico a month ago, has matured plans for a noteworthy increase in the output of steam and domestic bituminous coal and of coke. The company has in operation two new and well-equipped coal mining plants; one, with a single drift opening, at Blossburg, four or five miles west of Raton, N. M.; another with three drift openings, at Van Houten, about 10 miles southwest of Raton. The accompanying illustrations show the general aspects of the mines. The Van Houten plant dates from 1902, and the Blossburg plant from 1903. The former has electric haulage, the latter the tail-rope system; in both operations the maximum possible use is made of gravity.

These mines, now served by a branch of the Atchison, Topeka & Santa Fé railway, will have similar connections with a new railroad, 120 miles in length, to be constructed by the St. Louis, Rocky Mountain & Pacific Co. The railroad is to extend from Des Moines, N. M., on the Colorado & Southern railway, 80 miles south of Trinidad, Colo., to the Elizabethtown gold mining district in the eastern foothills of the Rocky Mountains, about 70 miles west of Raton.

The company's mineral property consists of 189,470 acres of coal land in fee simple, and coal rights and surface necessary for mining in 314,300 acres. The area controlled, about 800 square miles, is one-half as large again as all of the anthracite coal regions of Pennsylvania, and five times as large as the entire Connellsville basin. This property is the largest body of coal land under one ownership in the United States. The coal lies in horizontal seams, mostly from 5 to 13 ft. thick, and is mined by adits and entries along the seams into the mesas or foothills. The mines are dry and non-gaseous.

GENERAL VIEW OF THE BLOSSBURG MINE.

Examinations of the coal field have been made in behalf of Fisk & Robinson of New York by three well-known geologists and engineers, viz., Prof. Orestes St. John; E. V. d'Invilliers, of Philadelphia, and William Griffith, of Scranton, Pa. With regard to the character and extent of the coal these engineers say:

"The property is not only extensive, but is well located and combines many of the principal factors which vouchsafe the integrity of a coal and coke proposition, and insure its commercial success.

"The geology, structure and topography of the Raton coal tract are all favorable to the regular occurrence of coal and for its economical mining. There are certainly three commercial coal seams, all outcropping above water level along the eastern escarpment of the mountain plateau, and therefore subject to drift mining.

"These three seams occur within an interval vertically of 800 ft. All yield good mining sections from 4 to 8 ft. in thickness, the lowest, or Raton, seam being the only one now commercially developed, and, within the scope of existing mines, yielding 6 to 8 ft.

"The coal lies at very gentle angles of dip, often quite flat and rarely exceeding an inclination of more than 11.5°. Some slight faults and dikes have been encountered and some intrusion of basaltic material causing the coal seam on either side, above or below, to be converted into a natural coke; but the region, as a whole, is singularly free from such effects, and such small dikes as have been met with have, in no case, caused any change in mining plans.

"Because of the thickness of the seams, the roof and floor ordinarily are not disturbed, either in driving entries or in working coal in the rooms. The floor is usually a hard slate, supported by massive Trinidad white sandstone below, and the roof is largely a tough slate in the Blossburg district, changing to sandstone in the Willow or Van Houten cañon.

"At Blossburg the coal seam nominally ranges from 5 to 7 ft., but the roof is comparatively poor and the timbering required is much greater than elsewhere in the field. The present limited average output is 500 tons per day. Such an enlargement of plant is justified as to secure an output of 1,000 to 1,500 tons a day. At the Van Houten mines an output of 200 tons per day can be readily secured from three mine openings, delivering to one tipple. The thickness of seam, absence of water, an excellent roof (requiring a limited amount of prop timber) large development, and a thoroughly well equipped and efficient mining plant, all combine to render the mining of coal here rapid and economical.

"The areas which these coal seams occupy are very great; how great it is not possible to assert now, in view of the fact that no occasion has arisen to do more than establish the integrity of the principal seam throughout its outcrop of 48 miles, and for a distance of one or two miles back from the eastern edge of the coal field.

"As thus defined this limited area of 42,700 acres of this one coal bed ought to yield about 300,000,000 tons of coal, with an assurance of 50,000,000 tons more in the higher seams on this property within only one-tenth of their known area of occurrence.

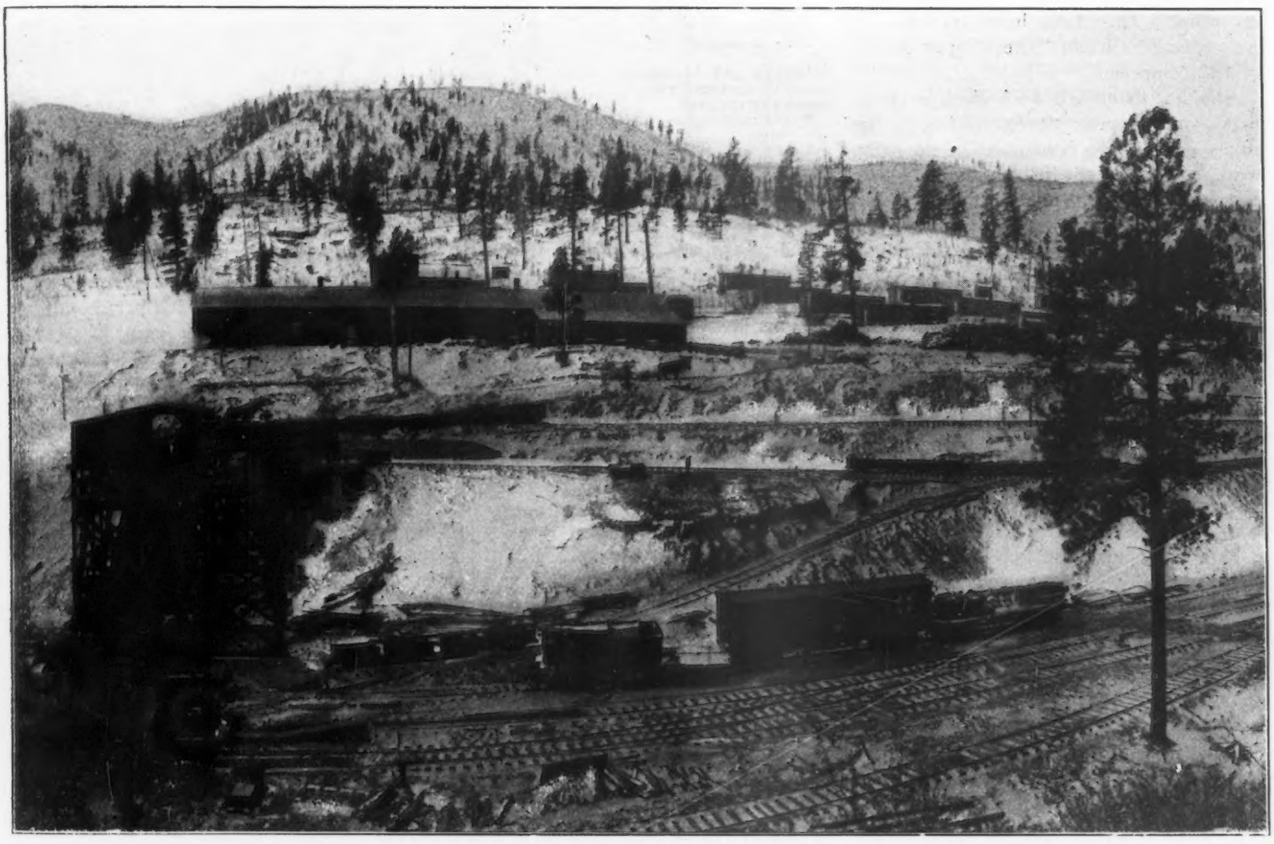
"Aside, therefore, from the enormous reserve tonnage in the remainder of the tract—460,000 acres—the available coal tonnage of the eastern escarpment of the field, open to drift mining, is 350,000,000 gross tons.

"As the coal beds are thick and generally free from faults or dislocations, they can be mined cheaply. Moreover the coal on this property is as thick, as accessible and as good as in any of the competitive fields, and should therefore command as good a market and serve the same purposes as the best New Mexico and Colorado coals."

The results of numerous chemical analyses show a remarkable uniformity in the character of the coal in the Raton district, as now more or less developed over an area extending for some 25 miles southwest of Raton. All show notably low percentages of sulphur, 0.75%, and a high ash, averaging about 15% for the run-of-mine. In comparison with the Colorado coals the results are normal. The following statement gives two analyses, the first being the average of three mine sections taken from the Blossburg mine, and the second the average of two mine sections taken from the Van Houten mine:

	Blossburg.	Van Houten.
Water	0.764%	1.280%
Volatile matter	34.416%	34.870%
Fixed carbon	49.986%	50.152%
Sulphur	0.644%	0.638%
Ash	14.170%	13.060%
Total	100	100

The present output of the two commercial mines is about 400,000 tons per annum. The capacity of the existing plants, with the expenditure of perhaps $100,000 on new equipment and enlargement, could be quickly brought up to 1,000,000 tons per annum. But a property of this size, having an abundance of raw material and facilities for developing its resources rapidly and economically, can hardly be fulfilling its destiny on an output of 1,000,000 tons, especially as the construction of the requisite plants could enlarge production to a point limited only by the market. Hence an annual output of 1,500,000 to 2,000,000 tons within the next five years is confidently anticipated. A large and rapidly increasing demand exists to the southward in territory served by the Santa Fé railroad, and to the east and west in areas that will be brought within competitive reach through the construction of the proposed new railway.



TIPPLE AND MACHINE SHOP, LOOKING SOUTH, VAN HOUTEN PLANT.

With regard to the output of coke, now amounting to about 42,000 tons per annum, from 84 ovens, situated at Gardiner, near Blossburg, the engineers say that, excepting only the Crested Butte and Cardiff (Colorado) cokes, which plants produce less than 100,000 tons annually, and the Sunnyside (Utah) coke of the Utah Fuel Co., the coke made from the Raton field ought to compare favorably with any local cokes now seeking a market in the great smelting and foundry districts of Southern New Mexico, Arizona and Northern Mexico. The company is planning 200 additional ovens.

The Cost of Mining—III.

BY W. R. INGALLS.

This article is simply to summarize the mining costs at Lake Superior, as reported by the companies which make detailed statements, none of the Lake mines having been included in my earlier articles.

The mines at Lake Superior are opened on veins of amygdaloid and conglomerate, mineralized with 0.5 to 2% of native copper. In width, the veins range from 12 to 20 ft. They are of great longitudinal extent, and are also persistent in depth. They dip from 30° to 60° (which has an important bearing on the cost of mining) and are commonly operated by inclined shafts. Developments are generally extended a long way ahead of stoping. Equipments and methods are of the highest order. They have been described in Mr. Rickard's book, "The Copper Mines of Lake Superior."

Atlantic, 1901—Ground broken in openings and stopes, 24,883 fathoms; in stopes only, 22,320 fathoms. Development work comprised 281 ft. of shafts, which cost $24.52 per foot (underground expense alone), 11 ft. of forks, at $13.78; 72 ft. of winzes at $10.63; and 6,223 ft. of drifts, 8 x 10 ft., at $4.84. Stoping cost $4.09 per cu. fathom (*i. e.,* 6 x 6 x 6 ft. = 216 cu. ft.). Quantity of ore milled, 409,124 tons. On this basis mining costs per ton were as in the table given herewith.

1902—Ground broken in openings and stopes, 25,764 fathoms; in stopes only, 23,197 fathoms. Development work comprised 313 ft. of shafts, at $24.17; 27 ft. of forks, at $15.16; 75 ft. of winzes, at $9.89; and 5,982 ft. of drifts (8 x 10 ft.), at $4.96. Stoping cost $3.98 per fathom. Quantity of ore milled, 446,098 tons. On this basis mining costs were as in the table given herewith.

1903—Ground broken in openings and stopes, 27,063 fathoms; in stopes only, 24,300 fathoms. Development work comprised 225 ft. of shafts, at $22.80; 6 ft. of forks, at $14.45; and 6,961 ft. of drifts, 8 x 10 ft., at $5.40. Stoping cost $4.17 per fathom. Quantity of rock milled, 431,397 tons. On this basis, mining costs per ton were as in the table for 1901, 1902 and 1903, as given herewith.

	1901.	1902.	1902.
Development work	$0.093	$0.086	$0.099
Stoping	0.223	0.208	0.235
Timber, tramming and labor.	0 297	0.268	0.273
Timber, material and supplies	0.088	0.065	0.057
Pumping and operating air compressors:			
Labor	0.029	0.227	0.032
Fuel	0.084	0.229	0 027
Supplies and material	0.014	0.011	0.010
Superintendence and surface labor	0.086	0.076	0.074
Supplies and materials used on surface	0.039	0.033	0.042
Fuel	0.132	0.075	0.044
Fire insurance and taxes	0.026	0.017	0.022
Expenses and sundry repairs.	0.011	0.012	0.015
Electric lighting and wiring	....	....	0.007
Total[1]	$1.092	$0.907	$0.937

[1]These costs for the Atlantic are exclusive of construction account and New York office expense, but include breaking and sorting the ore. The stoping for 1901 was 22,320 fathoms; for 1902 it was 23,197 fathoms, and for 1903 it was 24,300 fathoms.

Baltic, 1901—Rock hoisted, 144,603 tons; rock milled, 114,703 tons, or about 71% of the rock hoisted. Development work comprised 492 ft. of shaft, at $22.75 per foot (underground expense only), and 2,733 ft. of drifts, at $5.80. Reckoning the mining cost upon the tonnage of rock hoisted, the items of expense were as in the table given herewith.

Development		$0.187
Mine captains		0.025
Timbermen and helpers		0.073
Miners and laborers		0.409
Trammers		0.292
Mechanics and civil engineers.		0.030
Timber and supplies		0.187
Teaming		0.010
Power drills:		
Engineers and firemen	$0.014	
Mechanics	0.028	
Fuel	0.057	
Supplies	0.047	
		$0.146
Hoisting:		
Engineers and firemen	0.060	
Mechanics and laborers	0.016	
Fuel	0.083	
Supplies	0.027	
Fire insurance	0.005	
		$0.191
Selecting and breaking		0.144
General surface work		0.085
General expense:		
Superintendence and office expense	0.047	
Taxes	0.104	
		$0.151
Total		$1.930

1903—Rock hoisted, 528,517 tons, of which 38,134 was poor rock from shafts and other openings; only 146 tons of poor rock was sorted out in the rock house, 490,237 tons being sent to the mill. Development work comprised 480 ft. of shafts, 5,561 ft. of drifts, 328 ft. of crosscuts, and 76 ft. of forks. The cost of mining reckoned on the basis of 490,237 tons of ore milled, including development work, was as follows:

Superintendence and labor, underground	$0.681
Hoisting	0.057
Power drills	0.068
Timber and supplies, underground	0.169
Superintendence and labor, surface	0.031
General expense and surface supplies	0.019
Rock-house expense	0.091
Total	$1.116

Franklin, 1900—Old Franklin mine. Hoisted, 118,460 tons; milled, 113,930. Cost of mining and hoisting, $1.16 per ton. Development work comprised 1,024 ft. of drifts, at $7.91; 162 ft. of crosscuts, at $7.87.

Franklin Junior mine. Hoisted, 170,896 tons; milled, 154,641 tons. Cost per ton of rock hoisted, $1.43. This cost is stated to be not excessive, considering the narrowness of the lode and large amount of water in the mine. Development work comprised 205 ft. of shafts; 37 ft. of winzes; 4,023 ft. of drifts, and 417 ft. of crosscuts. Average cost of drifting, $7.38.

1901—Old Franklin mine. Hoisted 121,336 tons, at cost of $1.12 per ton. Development work comprised 138 ft. of drifts, at $8.77 per ft.; and 497 ft. of crosscuts, at $8.37.

Franklin Junior mine, Amygdaloid lode. Hoisted 123,350 tons of rock, at cost of $1.26 per ton. Development work comprised 256 ft. of shaft, at $13.45; 2.598 ft. of drifts, at $7.37; and 192 ft. of crosscuts, at $6.89.

Franklin Junior mine, Peninsular lode, conglomerate. Lode from 12 to 18 ft. wide, averaging 15 ft. Entire width mined. Rock hoisted by 6-ton skip. Hoisted 81,726 tons, at cost of $1.19 per ton. Development work comprised 176 ft. of shaft (8 by 20 ft.), at $11.30 per ft. (raising); and 2,631 ft. of drifts, at $7.82.

1902—Old Franklin mine. Hoisted 109,097 tons, at cost of $1.22 per ton. Development work comprised 285 ft. of drifts, at $8.63; and 359 ft. of crosscuts, at $7.48.

Franklin Junior mine, Peninsular lode, conglomerate. Hoisted 209,484 tons of rock, at cost of $1.05 per ton. Development work comprised 147 ft. of shaft, at $14.39; 5,322 ft. of drifts, at $7.71; and 44 ft. of crosscuts, at $7.35.

Osceola, 1901.—Tons of rock mined, 958,272; hoisted, 892,172 tons; milled, 793,207 tons. Cost of mining per ton of rock hoisted, $1.334.

1902—Tons of rock mined, 969,835; hoisted, 908,264 tons; milled, 836,400 tons. Cost of mining per ton of rock hoisted, $1.17.

Quincy, 1901—Tons of rock mined, 905,022; hoisted, 924,173 tons; milled, 886,266 tons. Average total force employed, 1,602 men; miners, 533. Average wages of miners on contract, $62 per month.

1902—Tons of rock mined, 983,730; hoisted, 984,594 tons; milled, 953,019 tons. Average total force employed, 1,636 men; miners, 562. Average wages of miners on contract, $62 per month.

1903—Tons of rock mined, 1,024,164; hoisted, 1,006,173 tons; milled, 958,935 tons. Average total force employed, 1,624; miners, 586. Average wages of miners on contract, $62 per month.

Tamarack, 1901—Tons of rock mined, 773,783; rock hoisted, 688,622 tons; rock milled, 626,905 tons. Cost of mining per ton of rock, $1.97; cost per ton of rock milled, $2.44.

1902—Tons of rock mined, 837,568; rock hoisted, 763,209 tons; rock milled, 658,720 tons. Cost of mining per ton of rock, $1.81; cost per ton of rock milled, $2.30.

1903—Tons of rock milled, 657,920. Cost of mining per ton, $2.32.

Wolverine, 1900-1901—Rock hoisted, 223,971 tons; rock milled, 190,104 tons. Development work comprised 523 ft. of shaft, at $16.82 per ft.; and 6,861 ft. of drifts, at $7.10. Stoping 10,381 fathoms cost $9.22 per fathom. The cost of mining per ton on basis of rock hoisted was as given herewith.

Development work	$0.257
Stoping	0.428
Timbering	0.015
Tramming	0.190
Mine captains and labor	0.077
Mechanics	0.015
Hoisting and pumping	0.078
Compressor	0.099
Teaming, etc	0.004
Supplies and fuel	0.038
General expense	0.120
Total[2]	$1.321

[2]A deduction of $0.216 should be made from the total on account of profit of supplies furnished contractors.

1901-1902—Rock hoisted, 213,650 tons; milled, 187,482 tons. Development work comprised 463 ft. of shafts, at $16.91; 66 ft. of raises, at $13.35; and 7,772 ft. of drifts, at $6.97. Stoping 11,350 fathoms cost $8.59 per fathom. On the basis of rock hoisted, the cost of mining per ton was as given herewith.

Development work	$0.295
Stoping	0.457
Timbering	0.020
Tramming	0.190
Mine captains and labor	0.095
Mechanics	0.024
Hoisting and pumping	0.071
Compressor	0.180
Teaming, etc	0.005
Supplies and fuel	0.065
General expense	0.180
Total[3]	$1.582

[3]A deduction of $0.24 should be made from the total on account of profit on supplies furnished contractors.

1902-1903—Rock hoisted, 299,922 tons; rock milled, 279,001 tons. Development work comprised 431 ft. of shafts, at $16.98; 197 ft. of raises, at $10.50; 4,531 ft. of drifts, at $6.63. Stoping 17,121 fathoms cost $7.54 per fathom. On the basis of rock hoisted, the cost of mining per ton was as given herewith:

Development work	$0.131
Stoping	0.430
Timbering	0.019
Tramming	0.175
Mine captains and labor	0.069
Mechanics	0.019
Hoisting and pumping	0.067
Compressor	0.085
Teaming, etc	0.003
Supplies and fuel	0.052
General expense	0.147
Total[4]	$1.197

[4]A deduction of $0.175 should be made from the total on account of profit on supplies furnished contractors.

Grade of Joplin Zinc Ore.

BY W. GEORGE WARING.*

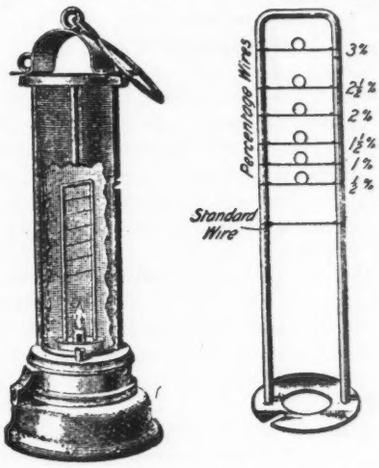
The average of 30 recent shipments of blende from Jasper county, Mo. (Joplin district) showed 58.477% zinc, 1.853% iron, 1.37% lead, 0.36% cadmium, 0.03% copper, 0.0159% arsenic, 0.00073% phosphorus, and traces of manganese, nickel and cobalt. Antimony was not tested for. When each of the 30 samples was assayed for lead, using 3 grams for each determination, the entire filtrates and wash-waters from the precipitation of the lead sulphite were combined, and the cadmium, copper, arsenic, phosphorus and manganese were estimated in the entire liquid, representing 90 grams of ore.

In the separate samples the percentage of zinc ranged from 55.65 to 62.60; that of iron from 0.62 to 5.45, and that of lead from *nil* to 3.37. One sample of ore, assaying 61.95% zinc, showed 2% iron and no lead. A sample, assaying 62.60% zinc, showed 1.12% iron and 0.32% lead. A sample, assaying 61.75% zinc, showed 0.62% iron and 0.09% lead.

*Chemist and Mining Engineer, Webb City, Mo.

Detecting Small Percentages of Gas.

It is now possible to equip the time-honored Davy safety lamp with a simple device by which small percentages of gas can be detected. This attachment and the method of using it are shown in the accompanying illustration. The Beard-Mackie sight indicator consists of a wire framework mounted on a plate which fits over the wick tube of the safety lamp.



The framework carries horizontal platinum wires, each one of which, except the lowest, is formed into a loop in the center, as shown. The lowest cross-wire is the standard one, and the lamp wick is adjusted so that this wire only just shows red in pure air. The percentage wires above show from one-half of 1% to 3%, respectively, according as the flame lengthens and heats them to redness. This device is particularly useful to fire-bosses, enabling them to detect small percentages of gas; 2½% is about the lowest percentage capable of being detected in the common Davy. Lamps thus equipped are in use in many American mines and in those of other countries.

German Coke in England.

Messrs. Cammell, Laird & Co. have entered into a large contract for German coke for their Cumberland works. Mechanically and chemically, this coke is said to be equal if not superior to the best Durham brands, and can be delivered at cheaper rates than are being asked for English coke today.

In directing attention to the foregoing, United States Consul-General Mason, of Berlin, says: It is now about ten years since the British iron masters were firmly convinced that German coke (made in retort ovens) could never equal beehive coke in quality or take its place in iron and steel manufacture. True, German iron mills were then making structural steel, rails and other railroad supplies, which were being sold at London and Liverpool in competition with home-made English products. They were enabled to do this because many leading German iron and steel works have their own coal mines and coking plants, and having saved in their coke making the gas, tar, ammonia and benzol (which constitute about 40% of the value of the raw coal) they were enabled to sell their steel at very close rates while deriving their profits—such as they were—mainly from the sale of their by-products.

But the idea had got fixed in the English mind that retort-oven coke would never do for blast furnace use; that it lacked resonance, "columnar structure," and other essential qualities. The same belief was, and is still to some extent, entertained in the United States; although there are enough retort ovens of the Otto-Hoffman and Semet-Solvay types in use in America to show by contrast that the archaic beehive-coking system (which pours out in the Connellsville and other districts vast clouds of smoke and valuable gas to blacken and defile the air and landscape) is as primitive and wasteful as it is obsolete and unscientific.

Chemical Industry of Hungary.

The American Consul-General at Budapest, Mr. F. R. Chester, states in the *Daily Consular and Trade Reports* (July 18, 1905), that in May, 1903, an American electrochemical company expressed itself as desirous of manufacturing certain chemical products in Hungary, notwithstanding that that country is a far better market for imports from the United States than as a field for manufacturing by foreign concerns. A careful inquiry into the chemical industries of Hungary for 1904 revealed the following facts:

Acetylene plants for public lighting exist at Tata (700 burners), Veszprém (600), Nagyenyed (400), Mezötúr (400), and at various stations of the Royal Hungarian State Railways and the South Railway. No acetylene-supply factories exist as yet. Carbide is difficult to procure and costly. There are seven calcium-carbide factories in Austria and Bosnia; the factory at Jajce, Bosnia, having 7,000 h.p., is Hungary's present source of supply.

Calcium cyanide and sodium cyanide are still used only in small quantities. They are quoted in Berlin as follows: Calcium cyanide, retail, 71c. per 2.2 lb.; wholesale, $39.28 per 220.46 lb. The German product pays $4.87 duty, and about $2.44 freight, before reaching the Hungarian market.

There is a good market in Hungary for the chemical products of the United States. In amount, saltpeter, sulphuric and sulphurous acids, hydroxide and carbonate of soda, refined sulphur, copper vitriol, glauber's salt, crude soda, acetic acid, acetate of lime, manure salts, calcium carbide, silicate of soda, chloride of lime and ultramarine comprise the chief articles in the list of chemical products consumed.

Coke dust and hard-coal (anthracite) dust are used as adulterants for graphite. They are not easily detected.

Breaker-Waste Disposal.

SPECIAL CORRESPONDENCE.

Among the various methods of handling rock and slate for removal to the waste bank, is one not so commonly used as the familiar scraper line or the time-honored mule and car—I refer to the endless-rope haulage and a side-dump car. This arrangement has been installed at the new plant of the Trevorton Coal Land Co., near Trevorton, Pa. Messrs. Pettebone & Ireland, of Wilkes-Barre, Pa., were the designers of the surface improvements at this plant.

At this colliery large quantities of slate and rock pass through the breaker. The coal seams have a steep pitch and about everything coming down to the loading chutes in the breasts is loaded into mine cars and is sent over the breaker.

The disposition of this waste is effected as follows: An ordinary side-dump car, operated by endless-rope haulage, transports the waste over a specially constructed trestle to a dumping ground near the breaker. The surface at the breaker is practically level, and the tracks at the loading lips of the rock pocket are about 66 ft. above the ground. An ordinary trestle leads from the breaker to a point where the rock dump was started, and from that point onward the trestle bents have 60 ft. centers. The bents are about 66 ft. high and are built of round timber. Connecting these bents are two trusses, one under each wheel of the dump-car (4 ft. 8½ in. gauge). The end trusses carrying the sheave-wheel can be moved forward to a new bent as the bank is extended. The endless rope travels between the rails of the track from an engine near the breaker to the sheave wheel at the far end of the trestle.

The dump car is equipped with two cable grips, located at the forward end, where are also placed the lever for dumping and the brake for controlling the car. This method of handling rock can be operated by two men; one man looks after the engine and loading of the car, and the other man goes with the car to the dump. The car holds about five tons. The car dumps from both sides at once, similarly to cars used on railroad grade work. It is seldom necessary for the man running this car to leave his position at the forward end.

The rock bank will be extended for a distance of about 1,600 ft. in a straight line, and then another line of track will start out, radiating from near the point of beginning of the first dump.

This is a quick and economical method of handling waste and, with certain precautions, should be successful. It has been the experience of contractors on railroad construction, in making a fill from a trestle, that large rock should be dumped simultaneously along the whole length of the trestle. Otherwise, if the filling is carried on from one or both ends, the bents will be shoved out of perpendicular. I know of an instance where a trestle at a mine was nearly wrecked by having the rock cars from the mine dumped from the track at one end of the trestle. The trouble was remedied by changing to the method noted above. If the Trevorton company keeps one or two additional bents ahead of the bank, filling around the bents can probably be effected without injury to them.

Oil Concentration.

Several years ago when Elmore described his process for concentrating ores by oil, mining men looked upon his work lightly; and in not a few instances treated it with levity. Undaunted, however, by their unsympathetic treatment, the inventor erected a small plant on a copper mine at Tyarnhaile, in Wales. The results yielded by this pioneer plant were satisfactory from the start; it afforded means for further experimental work under commercial conditions which resulted in proving the adaptability of the process over a wide field.

Elmore's process utilizes the selective affinity of oil for mineral particles by bringing finely pulverized ore in contact with an oil bath. This is done by charging it into slowly revolving cylinders provided with helical launders and low baffle plates. By this means sufficient agitation is obtained to bring the mineral particles into complete contact with the concentrating medium. The concentrates and oil are then floated into a heated flume or box, to increase the liquidity of the oil; then into a settling box, and, following this, with a centrifugal pan (charged with hot water and having an inward flange at the top) that revolves at a speed of 1,000 r. p. m. The hot water forms a vertical wall in the revolving pan and serves as a changing medium for separating the oil from the mineral matter—the oil remaining on the inner side of the water, while the mineral passes through it and packs on the side of the pan, where it can be easily removed at intervals.

For many purposes, the best oil is thick petroleum residuum. The oil has to absorb the mineral and still float on the water; therefore specific gravity becomes an important item. American petroleum with a sp. gr. of 0.88 is generally used. A viscous oil is best for catching the ore; but a less viscous one affords a better separation. The concentrate absorbs from 3 to 6 per cent of the oil. The activity of the oil is stimulated by the addition of acids, which "freshen" the mineral surfaces, free them from all traces of tarnish or oxidation, and render them most favorable for "gripping" the oil.

The latest plants consist of the following appliances: (1) Stone breaker to (2); (2) mill to (3); (3) first revolving cylindrical mixer, yielding heavy pulp with crust of oil and ore to (4), and light pulp to (5); (4) pointed settler yielding oil and concentrates to (7), water and sand waste; (5) second revolving cylindrical mixer, yielding heavy pulp to (4) and light pulp to (6); (6) third revolving cylindrical mixer, yielding heavy pulp to (4) and light pulp to (8); (7) first centrifugal separator, yielding concentrates to market and oil to (9); (8) large settling tank, yielding oil and ore, water and sand waste; (9) second centrifugal separator, yielding concentrates and oil to cooling store tank, whence it may be used over again.

This process successfully deals with copper and iron sulphides, and even wolfram and bismuth ores; experiments on a complex mixture of sulphides and arsenides of cobalt (that caused much trouble when treated by ordinary wet processes) showed that a good percentage could be saved.

Several modifications of the Elmore process have been patented. Sulman and Picard have developed a process for separating minerals from gangue matter by means of oil in the form of a vapor mixed with jets of air under a fairly high pressure. These inventors have also obtained favorable results in concentrating mineral sulphides by the use of fatty acids and resinous acids suspended in water.

Kendall has intrduced a process for the concentration of graphite and similar minerals which promises well. It consists in mixing the finely divided ore with water, bringing the mixture into thorough contact with a pure, thin oil (such as kerosene), and projecting this mixture at a high velocity under the surface of a quantity of ore, water and oil, in such a way as to afford opportunity for the oil-enveloped particles of mineral to pass upward to the surface; here arrangements are made for drawing them off as soon as they arise.

J. D. Darling (finding, like Kendall, that hydrocarbon oils have a strong affinity for carbon) devised another form of oil concentration for the treatment of graphite tailings which successfully recovers a high percentage of graphite in a clean form. The success with graphite led to experiments with coal dust; it was found that a pure amorphous carbon can be cheaply obtained from anthracite "culm." This carbon contains only about 1 to 2% of ash, and a small amount of volatile matter. In appearance it resembles lamp black, and can be used in place of it. It can also replace powdered charcoal in making black powders; and possibly it will form a substitute for charcoal in the manufacture of blister and crucible steel. Works are now being erected in Pennsylvania for the preparation of carbon by this method.

For some time experiments with an improved oil process have been carried out on the Central mine, at Broken Hill; it affords an almost complete recovery from crude zinc-lead sulphides, and also from by-products.

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Zinc in Tennessee.

An interesting development in zinc mining in the Holston river district of Tennessee has been the recent prospecting at considerable depth, both by diamond drilling and by shaft. One company has sunk a shaft to a depth of 200 feet, and is reported to be extracting ore from approximately that level. The mining in this district has been heretofore chiefly from open quarries, which have not been very productive of the blende, found in veinlets in the dolomite. The prospects at greater depth are reported, however, to be encouraging. The present shortage in the supply of high-grade zinc ore causes especial interest to be directed to any district which may afford a supply of that class of mineral.

Texas Petroleum.

A strong case of discrimination was made out by the Texas oil producers last week at a hearing before the Interstate Commerce Commission. The complaint, which has been referred to in our news columns, was that such rates were charged on oil that the Texas producers were practically shut out from competition with the Standard Oil Company throughout a great part of the Western territory. At the hearing the current rates on crude and refined petroleum per 100 lb. were exposed, as follows:

	Southbound.	Northbound.
New Orleans-Chicago	23c.	41c.
New Orleans-Cincinnati...	22c.	39c.
New Orleans-St. Louis.....	18c.	35c.

Rates to intermediate points were based on those given above. The Texas producers and the refiners in New Orleans and its neighborhood were obliged by the railroads to pay nearly double the rate on their competing products that the Standard was charged for its oil sent into Southern territory. The railroads wisely submitted no defence at the hearing, but gave up their case completely; announcing that a new tariff had been adopted, making southbound and northbound rates the same.

The Madagascar Goldfields.

There have been signs lately that the new field, for which the London mining market has been waiting, might be found in Madagascar. West Africa proved a failure, and Egypt has been limited to two or three companies, which do not promise an exciting career. In Madagascar there is a field of unknown value and some promise, which may possibly be worked to advantage. Recently several of the big South African firms have had parties exploring in the Island, and London has received glowing—though rather vague—reports of the probabilities of the new goldfields. The French Colonial Ministry, however, does not sympathize with this British exploitation of the field, and notice has been given that concessions will be strictly limited to actual discoverers; and that a large royalty, probably as high as 25 per cent. will be exacted. This promises to have a discouraging effect on the new enterprises.

Panamint.

It seems probable that this autumn there will be a rush of prospectors and miners into the old Panamint region of Inyo county, California. Indeed, there are many prospectors in the Panamint range already, and a number of promising discoveries have been made. The isolation of the region from railroad transportation facilities, and even roads, has retarded its development for a long time. Twenty years or more ago there were many mines worked in the Panamint country, but only a few of them were successful.

Now even much more isolated regions, such as those in the Nevada deserts, are proving rich and profitable, and this example bids fair to resuscitate Panamint. In the last few years, several new quartz mines have been discovered and some old ones have been re-opened.

The region is a rich one, but it has been only partly prospected. However, now that the overflow of gold hunters from Tonopah, Goldfield and Bullfrog is going in that direction, new and important discoveries may be expected. The men from those districts have become acquainted with the conditions of desert mining and are not to be frightened away from the mountains and valleys of Inyo county.

Drill Prospecting.

One of the important features in modern mining is the greatly increased use which is being made of the drill as a means for prospecting. In the iron regions of the North, and in the zinc district of Missouri, the churn drill has been for a long time the chief reliance in the discovery of new orebodies. The introduction of the dredge as a means for working alluvial deposits of gold, with the necessity for more accurate knowledge

enforced by the important cost of such plants, inaugurated a new use for the churn drill, in which it has already proved its worth.

More noteworthy is the increased employment of the diamond drill as a means for deep prospecting. Although its great value was demonstrated many years ago at Lake Superior and in the disseminated lead district of southeastern Missouri, for a long time its use did not greatly extend. Its tardy recognition is really a cause for marvel, in view of the character of its early achievements at Lake Superior and in Missouri. The original discovery by the St. Joseph Lead Co., at Bonne Terre, in 1869, was made with the diamond drill, and that apparatus has ever since then remained the sole reliance in the development of lead-bearing ground throughout the district.

A later achievement of extraordinary value was the location of the deep levels of the great banket reef at Johannesburg, and most recently diamond drilling in the Mount Morgan mine, Queensland, has revealed to the owners of that property an immense body of auriferous copper ore, previously unsuspected, in the lower levels of the mine. These instances are alone sufficient to prove the diamond drill one of the most valuable agents in the progress of mining. It is coming to be more and more appreciated, but it has not even yet attained its maximum of usefulness. There are few large mines which could not advantageously include a diamond drill among their equipment.

Handling Material.

Few engineering works effect so great an economy about industrial plants as improvements in handling material. We have even heard Telford's definition of engineering paraphrased to read "the art of handling material." This, of course, may be considered an extreme view. Certain it is, however, that the economic handling of material, whether it be of construction, of operation, or of production, constitutes by far the major portion of the engineer's work.

The mining engineer has to deal with, perhaps, a greater proportion of the forces and materials of nature than engineers in other fields of work. In the actual removal of his raw material, ore, its economic handling is the deciding factor as to the productiveness, and frequently the success, of the mine.

Again, in reduction works, economic handling is the foundation upon which the plant is built up. The process used may be eminently successful, the extraction of metal may be high, yet the cost of handling the material may be so prohibitive in poorly designed works, that they cannot be operated at a profit.

In the power plant itself, we may consider the energy developed, and even the source of energy, as a concrete material. The fuel, whether coal, oil, or gas, is susceptible of a maximum or minimum charge for handling or storage; steam itself may be developed at a low figure, and yet be transmitted between the boilers and engines at such speeds that its use may be uneconomical, or pockets may be formed in a badly designed pipe line, providing so many opportunities for the collection of "slugs" of water that breakdowns may be the direct result of uneconomic handling.

Similarly, in electrical-power production and transmission, the switching devices as well as the transmission line may be regarded as a means for handling material, although we hesitate to apply that term to a thing so vague as electricity, notwithstanding the practical analogy between its transmission and that of air, steam and water. Especially is the economy of handling (or transmitting) electricity important. The entire system adopted depends, in lines of considerable length, upon the investment made in the conductors.

The same principles apply to the development of water power; the direct line in this case may be considered as the straight and unobstructed pipe-line or penstock, with its low frictional resistance and freedom from constriction.

In handling material, as in geometry, a straight line is the shortest distance between two points, and the most direct communication is of necessity the most economical. That this simple fact is often lost sight of is evident by the complicated and roundabout methods too often found in works that are successful in spite of expensive methods of handling the raw materials and finished products and the agents that are employed in the process.

Misplacement of Shafts and Adits.

The article, by Stanley Hunter, under this very fitting title, which was published in this JOURNAL of August 12, touches on an important point in the economics of mining, and ought to be highly suggestive to the many who engage in the mining business without the benefit of expert advice. A mine contains a certain definite quantity of mineral, which is capable of yielding a certain maximum profit. The difference between the value of the product attainable and the expense of winning it, including the cost of shafts, adits, their equipment and all the other dead work, plus interest on the investment, is the profit. Practically the valuation of a mining property cannot be approximated in advance on this theoretical proposition, because there are too many unseen elements and changeable factors.

Probably the nearest approach to it is a thoroughly prospected deposit of placer gold. The deposit is flat and accessible in all parts; the unit value of the product is constant; the cost of exploitation has been reduced to a point beyond which the chances of improvement are slight, in so far as a particular kind of mining is concerned, hydraulicking, for example. Next in order of certainty are probably coal mines and some kinds of iron mines. Deposits of other ores are seldom capable of such accurate forecast, but there are examples of deep-lying orebodies which have been thoroughly delimited before stoping has been begun.

Irrespective of the ultimate result, however, it is a *prima facie* theorem that money spent on useless dead-work, or ill-advised dead-work which increases operating cost above what it ought to be, is money wasted, diminishing the net result of the mine by just so much. It is fortunate if it does not cause the attempt to develop the mine to be utterly abortive. A rich mine may stand much mismanagement, while in the case of a poor mine the maximum margin of profit may be entirely offset by the waste attributable to incompetent exploitation. The loss through misdirected preliminary work may consume all the capital of the original adventurers, and prevent them from carrying on the work sufficiently to recoup themselves, even when the mine offers the chance. Examples illustrating such occurrences were cited by Mr. Hunter, and every engineer of experience can multiply them to great length.

The long adits driven to crosscut veins dipping at gentle angles, the shafts sunk on the footwall side of the vein, the shafts and adits improperly located to command the vein, are testimonies to bad engineering, or rather to the absence of en-

gineering, just as much as are the reduction works which failed to operate and stand as monuments to the folly of their builders. The only difference is that the loss involved is generally better understood by the inexpert in the case of the latter than in the case of the former.

The moral is very simple. Individuals and companies who intend to develop a mine should employ an engineer to lay out the work, or to advise on it, even if they are determined to have it executed by a cheaper man. When a property is in the charge of a superintendent or manager who is not a trained mining engineer, it will pay the owner to have an inspection made periodically by a consulting engineer who knows his business.

Ore Bedding in Copper Smelting.

The remarks published elsewhere in this issue, over the signature "Engineer," are by one who is an engineer of high attainments and wide experience. They should not be construed as a particular criticism of the practice which has been adopted at the Copper Queen works, but rather as comments on the broad question as to the advisability of bedding ores preparatory to copper smelting; as such they should inspire a valuable discussion of a new subject, which is largely engaging the attention of metallurgical engineers. Assuming that the cost of copper smelting in this country may be generalized at about $2.50 per ton of ore, the introduction of a new feature in the practice, which may cost upward of 10 per cent of the total operation, is an important consideration. The question is a broad one and has many aspects. It is, however, capable of reduction to the elements of (*a*) cost and (*b*) metallurgical gain; the former being easier to determine than the latter. The result is likely to show that what may be best in one class of smelting may not be the best in another.

In lead smelting and copper smelting two radically different methods of handling ore, upon receipt at the works, have been evolved. The lead smelter accumulates a large portion of his supply in beds made up on a floor, involving much labor in spreading it over the beds and shoveling it into the barrow or buggy for conveyance to the furnace. The copper smelter, on the other hand, generally receives his ore in bins, which in modern practice are elevated in order to facilitate drawing off. Different ores are received in different bins; there is no labor in distributing the ore. In drawing off the ore to make up the furnace charge the labor is reduced to the minimum; the ore drops by gravity into the car, the desired proportions being taken from different bins. Certain smelters have gone so far as to instal platform scales beneath each bin, and some such arrangement is necessary to facilitate the weighing up of the charge.

This difference in practice has developed from the difference in conditions. The copper smelter, as a rule, treats only a few kinds of ore, and is not subject to narrow limitation in slag composition. His plant is apt to be based on the ownership of two mines, one furnishing cupriferous pyrites, the other silicious ore, which contribute the major portion of his supply. The large lead smelters, on the contrary, receive ores from numerous mines, to a large extent in comparatively small lots, the forwarding of which is likely to be irregular. The receipt of these in independent bins and the making-up of ore charges therefrom would obviously be difficult. The practice is therefore to combine the miscellaneous ores in a bed of mixture of known composition, which in making up the furnace charge serves as a single ore of large supply, always on hand; this can be fluxed with other ores of large supply as currently received. At that point, his method becomes analogous to that of the copper smelter; the bed has previously served as an equalizer for the small ore lots of widely varying composition. When the lead smelter has only a few kinds of ore to treat, as, for example, in Missouri, he does not bed the ore, but weighs out each kind. On the other hand, the copper smelter who goes into the market for a variety of ores, largely in competition with the lead smelter, is showing a tendency to bed at least some of his ore, for the same reasons that the lead smelter does. It appears to us, therefore, that in discussing the subject it is necessary to make a distinction among the classes of work that the copper smelter may do. There is, moreover, the question whether he should bed none, bed all, or bed only a portion of the ore.

In the matter of expense it is essential to begin with the first cost of the plant. We may assume that a modern copper smelter of 1,000 tons daily capacity, or, say, 360,000 tons per annum, will cost in the neighborhood of $1.50 to $1.75 per ton of annual capacity, without ore storage. Prudence will generally decree the stocking of 30,000 tons of ore, one month's supply. Elevated bins can hardly be built for less than $3 per ton of capacity, which would come to about 25 cents per ton on the annual capacity of the works. Amortization at 10 per cent. and interest at 6 per cent. would make the fixed charge on this account come to four cents per ton of ore smelted. Storage on the ground would cost not more than one-third as much. The cost of the elevated storage would, in fact, be relatively more than the bunker cost alone, because of the cost of the trestles to give access to them, the cost of the multiplicity of weighing scales, which are necessary to give them their maximum of efficiency, and finally the surplus storage capacity that must be provided to accommodate the different kinds of ore and enable bins to be emptied cleanly for the purpose of a cut-off. Obviously this factor of surplus capacity is of the more consequence, the more are the varieties of ore purchased and the more frequent the cut-off it be desired to provide for.

In our estimates above, we have not aimed to make precise calculations so much as we have sought to establish the point that the lower cost of handling ore through elevated bins as compared with handling it on the ground, in beds or otherwise, is to some extent offset by increased capital charges, disregarding the question of advantage as to metal extraction, etc. The problem is capable of treatment in a great variety of ways besides the extremes which we have had in mind, as, for example, the compromise method which has been tried at the Copper Queen works, or the alternative of carrying a portion of the stock in elevated bins and a reserve on the ground. It is without doubt the ideal metallurgical practice to carry all the ore in elevated bins, arranged in such a way as to obviate all handling, and weigh out the definite proportion of each charge component. In works for the treatment of highly concentrated ore (as, for example, zinc smelteries for the treatment of blende, lead smelteries for the treatment of galena, and tin smelteries for the treatment of cassiterite), this is almost always most economical, with respect to both operating cost and metal extraction. In works treating a large variety of low-grade ore the question is more complicated.

Metallics.

According to Prof. H. O. Hofman, zinc blende ignites at 600° C.; marcasite at 378° C.

The cost of building an ordinary 14 by 60 ft. reverberatory roasting furnace is, roughly, $3,000.

Works telephones should always have a ground connection, for protection in case of electrical storms.

Noise, of any unusual kind, or of unusual amount, is always a sign of derangement in machinery.

Springs that have lost their elasticity may sometimes be utilized temporarily by drawing them apart to increase their length.

Converter plants of the present standard design cost approximately $30,000 per stand. Each stand is provided with three or four shells.

Carbon is the source of heat in coke. Other properties being equal, the larger the percentage of carbon the greater is its heating effect.

If belt conveyors are used to carry material to crushing rolls, the feeders can usually be dispensed with, as the belt feed is more uniform.

Concrete mixed with sea water, or even brackish water, is apt to flake off at the surface, due to the formation of salt crystals in the process of setting.

Cassiterite mining in the United States does not furnish as much tin as the "detinning" process, by which scrap from can factories is treated electrolytically.

The vacuum refrigerating machine is based on the same principle as the absorption machine. Water is the evaporated medium, and sulphuric acid is the absorbent.

By providing a proper drip on the overhanging coping, brick walls may be kept from the unsightly appearance so often seen as a result of the retention of moisture in the wall.

Air holes in massive castings may be filled by "burning in" sufficient iron of better quality to fill the opening. In base plates and heavy work of that description, the practice is admissible.

"Dope," made of tallow and the leavings of graphite paint, is excellent for protecting finished surfaces of machinery. It is easier to remove than the ordinary linseed-oil-and-tallow combination.

In the duplex steam-pump something must actually break or come apart before the pump is put out of commission. This explains the preference shown by engineers for this type of boiler feed.

Where wrought iron or steel links are used to the extent that the holes become worn, temporary repairs may be effected by reheating and contracting the holes by hammering; after this they may be rebored.

The difference in melting point between the asphaltum and the paraffin residues of petroleum is a matter of only a few degrees, and yet that means all the difference in the world in practical commercial value and utility in the arts.

One of the highest electro-motive forces produced by chemical means is that of a couple consisting of potassium amalgam combined with pyrolusite in a porous cup containing potassium permanganate. The other pole may be either carbon or platinum.

The same quantity of electricity will liberate at the cathodes of three cells, respectively, 1 gram of hydrogen; 23 grams of sodium; 32.5 grams of zinc. The quantity is relatively the atomic weight of the element in question, divided by its acting valence; and it is called the equivalent.

The individual wires comprising the cables of the Brooklyn Bridge are not jointed, as is the present practice in suspension cables for bridge work. The ends are butted, and the friction (due to the pressure of the wrappings) is depended upon to keep the wires from pulling apart.

Iron or steel bands used to attach guys to the ends of square masts or hoisting rigs, should be of "V" and not the "U" form. This will result in tying to the corners (instead of to the center of the sides) of the mast. It is safer and cheaper and puts only tensile stresses on the material.

Quicksilver is bought by avoirdupois weight in iron flasks containing about 76½ pounds. When in the form of amalgam, which is weighed in troy weight, it is necessary, for comparison in battery work, to reduce the avoirdupois pounds consumed to troy ounces. One avoirdupois pound contains 14,583 troy ounces.

The value of a sample is largely measured by the care with which it is prepared. At many a large plant there is an efficient force for the sole purpose of preparing samples. The cost of analysis of one constituent of a standard sample may be rated at 3 to 6 cents. The cost of preparing a good sample is not far from this figure.

One interesting point to be borne in mind is that combustion is more vigorous under air pressure than it is in the open atmosphere. This is observed in bridge caissons, where work is carried on under air pressure. Lights burn with larger flame. The reverse is observed in the feeble combustion in the thin air at high mountain summits.

The air which operates the air locomotives in large plants is distributed over the grounds in a system of carrying pipes, and at a pressure of as high as 900 lb. per square inch. The head of the locomotive reservoir which receives this highly compressed air is a heavy plate of steel; it carries a pressure of several hundred tons, and yet accidents from any breaking of this head are comparatively rare.

When zinc blende is coated with greenockite (cadmium sulphide) so as to present a striking appearance, due to the brilliant yellow color of the cadmium sulphide, it is found seldom, if ever, to assay more than 0.3 to 0.5% cadmium, at least not in the Joplin district. All the cadmium is on the outside, a secondary deposit. When blende is very rich in cadmium, the latter never shows; in fact, does not alter the color of the blende at all.

A new feature in the Joplin district is the manner by which acid mine water is prevented from corroding pumps, pipes, jig-screens, etc. A small stream of milk of lime is conducted down to the mouth of the suction pipe of the pump. The sulphate of lime thus formed coats the pipes, etc., with a protective film of gypsum, which preserves the iron, although the water is not completely neutralized, nor its metallic salts entirely decomposed.

A strong chemical argument against the simple "organic" theory of the origin of petroleum is that the oil is much more highly reduced than is the product resulting from distillation of common organic residuum. In the latter case the hydrocarbons (often nitrogenous) are not in the state of extreme chemical reduction; but much (not all) of crude petroleum consists of members of the paraffin series which represent the maximum of hydrogen reduction of carbon.

The sulphur in coke should be under 1%, if the fuel is to be used in iron smelting. Low sulphur is desirable in most metallurical operations; but in some, sulphur is less objectionable than in others. The best coke contains only 0.5 to 0.75% sulphur. Ordinarily, the sulphur in coal is in a certain proportion to the ash, but there are exceptions. The reduction of the slate in coal by washing or picking generally reduces the sulphur. About 40% of the sulphur in the coal is volatilized in the coke oven.

When ore is crushed the ore proper is usually pulverized first, as it is more brittle than the matrix or gangue of rock which accompanies the mineral. This fine ore tends to pass the ordinary screens, but there is a point which seems, in the case of many ores, to limit the readiness of pulverization. This limit appears in many tables of screening tests to be reached at about 160 to 180 mesh. In other cases the finest slime will carry the richest value. The conditions and qualities governing the pulverization limit of ore have not yet been worked out.

Colliery Notes.

At some anthracite collieries, shaking screens are supported by rods, and at others by boards. G. B. Markle & Co. use both on the same screen. A rod with a turnbuckle supplements the board hangers as additional security in case of breakage of the other hangers.

Coal breaks when moving under pressure; falling freely, less harm is done in this respect. Successful handling of coal in storage-plants recognizes this principle in reloading. The coal should be gathered from stock-heaps at the edge of the pile, rather than from a point under the middle of the heap.

Taking a mixture of equal weights of several sizes of coal, greater screening surface is required for the small than the large sizes. There are a greater number of pieces of pea than egg in equal weights of coal. Therefore, for proper separation, a greater number of openings should be provided in screening the buckwheat than in the case of egg coal.

G. B. Markle & Co., in the Lehigh region of Pennsylvania, have introduced shaking screens in three of their breakers to take the place of bars at the dump. These shakers are supported on wheels, instead of the usual hanger, on account of the heavy duty required of them. Each shaker is supported by four ordinary 9-in. mine-car wheels, which run on short pieces of T-rail. The lump coal from these shakers passes over chutes, or picking belts, is cleaned, and then sent to the rolls.

The deepest coal shaft in America is about 1,850 ft. In England one mine is 3,400 ft. deep and there are a number over 2,400 ft. In Belgium the greatest depth attained is at the Produits colliery, where the shaft is 3,773 ft. deep. The experience gained at these depths proves the possibility of working down to 4,000 ft., and under some conditions of approaching 5,000 ft. Temperature is one of the chief difficulties in such mining, but hoisting problems will also arise. The Belgian mine is the deepest in the world from which coal is being hoisted.

Glazed terra-cotta pipe is used exclusively in Schuylkill county, Penn., around breakers and washeries. In long chutes, this pipe is taking the place of troughs lined with sheet iron for the transportation of fine coal with water. The glazed pipe used for this purpose has either a cross-section of 8 by 18 in. or of half of a 24-in. round pipe. Three-foot lengths of pipe are laid on plank and the joints cemented; then the side planks are nailed on. The pipe-chute is given ½ in. more pitch than the sheet-iron trough, or it has a pitch of 1½ to 2 in. to the ft. Pipe-troughs are durable and likely to come into general favor for some purposes.

Discussion.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of THE ENGINEERING AND MINING JOURNAL.

ORE BEDDING AT COPPER SMELTERS.

The Editor:

Sir—I believe the illustrations of the Copper Queen ore beds, given in the JOURNAL of August 5,. are the first direct reference in technical literature to this important change in the handling of copper ores at that smelter. I mean the introduction of the bedding system which the lead smelters have practiced for so many years. Few of the older copper works are able to use this system, as no preparations were made for it in their design, but a tendency to imitate it where possible is somewhat noticeable, and it is worth while to consider whether it gives advantages that are equal to its cost.

That bedding increases the cost of handling admits of no doubt. It always requires extra labor and usually a considerable amount of hand work; and, judging by your illustrations, the attempt of the Copper Queen management to substitute mechanical for hand work is not a success. The second illustration shows that the bed cannot be made solely by dumping the cars into the pit, and the V-shaped open spaces between the side piles that are made by dumping from the cars must be filled by shoveling.

The standard practice, carried to its highest development, may be stated about as follows:

1. Fifty-ton dump cars filled from bins at the mine and running over strongly built bins at the smelter. The ore can be unloaded by contract for 0.5c. per ton, which includes unloading all box and gondola cars that come to the works from outside sources (and the proportion of this shoveled material can be very considerable, even at this low cost).

2. Filling the furnace charge-cars from these bins while the cars rest on platform scales, so that the charge, or each component of the charge, is weighed as it is drawn from the bin.

3. Transportation to the furnace, usually by electric power.

4. Charging into the furnace.

The lowest figure of cost I have seen, for the last three of these operations, was that given by Mr. Channing in the JOURNAL (March 28, 1903), namely, 4.59c. per ton. This, of course, represents Eastern prices for labor and materials. At a Western works I was informed that the cost for the same three items was six cents.

Such economy cannot be reached if even the slightset amount of hand labor is introduced into the method, as witness the lead smelters, who, for metallurgical reasons, use a large charge-car, filled by wheelbarrows or buggies, but othewise using every mechanical economy in charging. The lowest cost by this method I have encountered was 13.5c. per ton, which was obtained under the most favorable circumstances at a plant where 17 or 18c. was the usual minimum. The quantity smelted in these two plants was sufficiently near equality to show that the difference in cost was due to filling the lead charge-cars by hand. Mr. Dwight, in his elaborate discussion of mechanical charging of lead furnaces, does not give the cost except in one instance,[1] and then indirectly. If I am right in calculating a burden of 177 tons a day for each furnace, the labor cost given, $41 per furnace-day, figures out 23.7c. per ton, to which must be added, I suppose, power, maintenance, etc.

Returning to the bedding of the charges for a copper furnace, it is evident that the practice must add very materially to the cost of charging. In the Copper Queen system, judging from the view of the half-filled pit, at least one-half the bed must be turned over by shovelers, the limestone being distributed in the same way. In fact, shoveling cannot be avoided when several different ores and fluxes are laid in one bed. The cost of that work alone cannot be less than 10c. per ton, with 15c. as a more probable minimum. Loading the charge cars by steam shovel may be taken at 5c., and to these figures must be added something for the extra cost of unloading the mine cars as they arrive at the pit. Here is no center-dump car that drops 50 tons by the pull of a lever. If self-dumping, the cars must be side-dumpers or turn-overs; and, if side-dumpers, one side cannot be discharged until the half empty car is run around to the other side of the pit. This means cost. It is hardly probable that the cost of this mixing, rough as it is, can be less than 25c. a ton, or about half the cost of the more carefully made lead mixtures. To all these items must be added the transport along pits that are 1,000 or 2,000 ft. long, and situated at least as far from the furnace.

The peculiarity of the bedding, as now practiced for a copper furnace, is that everything that goes into the furnace, except coke and perhaps slag, is bedded; while I believe the practice of the lead smelters is to weigh out ores of large constant supply for themselves, and bed only irregular lots and ores needed for their composition. Though the above calculations are crude, they show that the expense of bedding alone must be more than the whole cost of charging from bins, and the question is, does it afford a compensatory gain? At present the best slags in the country are made at plants where bedding is not practiced, and I doubt whether bedding would improve their results. It would require a saving of 3 or 4 lb. of copper per ton of slag to recoup the cost of bedding, and there are few

[1] *Trans.* Am. Inst. Min. Eng., Vol. XXXII, p. 386.

well-managed works where such a saving could be hoped for.

Bedding is the latest novelty in copper work, and I expect to see it taken up more or less as a fad, but will it pay? The answer is simple enough. It will not pay unless it produces savings or reduces expenses to a greater extent than its own cost.

The same is true of the suspended scales which some works are using. As weighing machines they are practicable enough, though I have doubted if the rough constructions I have seen can be really accurate. The question of economy, however, rests upon other considerations. When platform scales are used, the bin gates are moved and the scale beam is read from the same level, the ground. This cannot be done with a scale beam that is suspended 8 or 10 ft. above the ground, and if it is necessary to have an extra man on each shaft on the upper level to fill the scale hopper and read the scale beam, there is extra expense with no actual gain. The wear and tear upon platforms, and the possibility of derangement by the constant shocks of trains are such common items in the use of scales that we need not expect them to be of unusual importance at furnaces.

I am not discussing principles of metallurgy, but the cold calculation of costs of labor, power and maintenance; and, unless these innovations can justify themselves on the ground of convenience or economy, I think they ought not to be accepted by a prudent

ENGINEER.

Boston, August 15, 1905.

EXPLOSIVE ROCK.

The Editor:

Sir—The subject of "explosive rock in mines," as considered in this JOURNAL by J .B. Jacquet (March 30, 1905, p. 605), and subsequently discussed by F. W. Sperr[1] and C. S. Palmer,[1] is worthy of attention from mining engineers and managers. Three different theories are advanced in explanation of these phenomena, namely: (1) Molecular strain; (2) occluded gases; (3) compression of the slates. We may safely reject (1) and (2).

In one of the collieries in the south coast district of New South Wales there are, or at any rate used to be, frequent accidents of a minor nature, caused by fragments of coal flying out from the face with great violence, sometimes causing broken limbs. This phenomenon was evidently caused by gas under a high state of compression, for methane was constantly given off in large quantities. The gas tension was of some service to the colliers in winning the coal from the bords and headings, for if the pit stood idle for a few days, as was often the case, the coal faces became "winded," or, in other words, the gas had to a great extent escaped from the face to a depth of some feet; consequently, the coal was much harder to extract till that portion was removed on resuming work.

Again, the walls may be in a condition of strain, and yet the kicking ground may not bend. As a matter of fact, it seems reasonable to suppose either or both may be a cause. On the lode-material being removed, the hanging wall under the superincumbent pressure tends to assume a catenary curve, giving rise to rather abrupt bends at the points of its support by the pillars of ore, and which (when the rock is of an unyielding nature) would tend to cause it to fly in flakes; just as, when we bend a piece of rusty tinplate acutely, the particles of rust will fly off sharply. The breaking up into fragments may often be observed on bending a sheet of glass till it breaks, when it will sometimes shatter up into a good many pieces through the shock; how much more, then, may a jointed rock be expected to break up under a sudden fracture?

Mr. Jacquet's suggestion that stulls and head-boards should be used for the last 20 or 30 ft., when stoping upward from a lower to an upper level, is good; but although this would possibly lessen the liability to kick, still there would come a critical stage when the backs were worked nearly up to the level above. I would suggest that on starting to stope upward from the lower level, stulls and head-boards should be used to support the hanging wall for the *first* 20 ft., as well as timbering the last 20 or 30 ft., as suggested by Mr. Jacquet. The trouble seems to be becoming more serious as the workings get deeper.

SIDNEY FRY.

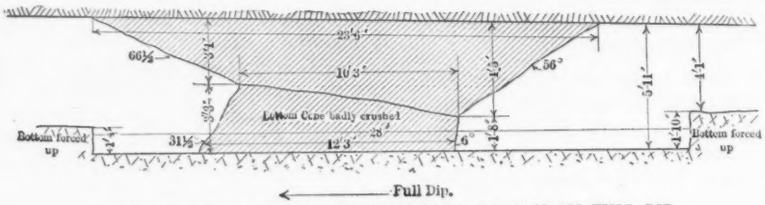
Westport, N. Z., July 1, 1905.

[1] This JOURNAL, April 13, 1905, p. 717.

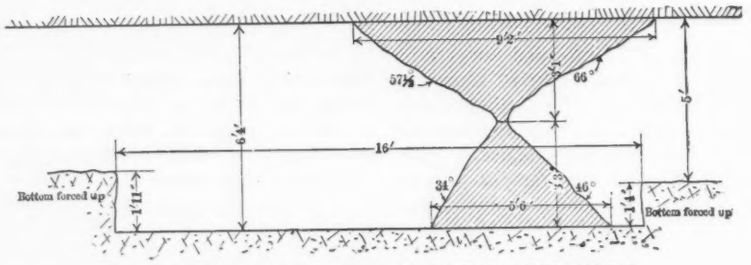
SIMULTANEOUS JOINTS.

The Editor:

Sir—An interesting example of the four systems of joints produced in a rectangular prism by a steady pressure acting on two opposite faces, all other faces being unsupported (which subject was dealt with by George F. Becker in this JOURNAL June 22, 1905), came to my notice recently. In 1903 a squeeze or creep took place at the Singareni (Indian) collieries of the Hyderabad (Deccan) Co., Ltd. A considerable area of ground rests on pillars in the old workings; in part of this area the sandstone floor (between two parallel faults that converged upward) unexpectedly proved itself weak and allowed the superincumbent strata to descend slightly. The sandstone floor (which varied from its normal constitution) sheared and was squeezed out from under the pillars, swelling up between them. The strong sandstone roof was practically unbroken.



SIMULTANEOUS JOINTS—LONGITUDINAL SECTION ON FULL DIP.



SIMULTANEOUS JOINTS—CROSS-SECTION ON LEVEL COURSE.

The pillars, of course, were subjected to the kind of pressure referred to above. The result in the case of one pillar is shown on the sketch given herewith, which states the dimensions of the original and of the squeezed pillar.

HUMPHREY M. MORGANS.

London, England, July 17, 1905.

Natural Gas Production in 1904.

The approximate value of the natural gas produced and sold in the United States, as reported to the United States Geological Survey, is shown in the following table:

State.	Value.
Arkansas and Wyoming	$ 6,515
California	114,195
Colorado	14,300
Illinois	4,745
Indiana	4,342,409
Indian Territory and Oklahoma	49,665
Kansas	1,517,643
Kentucky[1]	332,404
Missouri	6,285
New York	522,575
Ohio	5,315,564
Pennsylvania	18,139,914
South Dakota	12,215
Alabama and Texas	14,082
Utah	
West Virginia	8,114,249
Other States	
Total[2]	$38,496,760

[1]Includes small quantity produced in Tennessee.

[2]Does not include value of gas produced in Canada and consumed in the United States.

Correspondence.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Letters should be addressed to the Editor.

We do not hold ourselves responsible for the opinions expressed by correspondents.

Potash Salts in the United States.

In this JOURNAL (July 22, 1905, p. 97) there occurs a valuable article on "The Louisiana Sulphur Industry," by Alfred J. Lotka. In this article the following statements are made: "The United States is provided by nature with nearly all the raw materials for chemical and other industries more abundantly than the European industrial countries. . . . *Potash salts only are entirely wanting.* (The italics are mine.) . . . Until recently sulphur was not available in sufficient quantity, but this want has been supplied, and now America will presumably cease, largely, if not entirely, to import sulphur and pyrite, and will, at least in part, supply Europe also."

As a result of several years of professional work in the West and Southwest, including Mexico, some months ago I made the discovery of what promises to be a rich source of potash salts.

A portion of the area occupied by these salts is situated along the southern-central border of Wyoming and extends over into Colorado. It is, however, also known to occur in other portions of Wyoming, and in Idaho. The material is immense in quantity and, so far as I am aware, never occurs more than a few feet below the surface. It may be easily and cheaply worked, and by methods and appliances now well known. The salts occur mainly in the form of a carbonate.

CLEMENT L. WEBSTER.

Charles City, Iowa, Aug. 3. 1905.

Gold in Santo Domingo.

Sir—The article of Mr. Lynwood Garrison (this JOURNAL, June 15, 1905, p. 1128), as well as Mr. O'Day's letter (this JOURNAL, July 15, 1905, p. 69), under the above heading, recalled to my memory some incidents connected with a six months' sojourn in Santo Domingo. The observations I made there regarding the precious and other metals may prove of interest.

The historical data quoted by Mr. Garrison are quite correct and apply equally to the other West Indian islands. Adam Smith, in "The Wealth of Nations," refers to the gold of Cuba. Here in Scotland gold is found in small quantities, but a gold-bearing reef or vein has yet to be located.

The first careful survey of Santo Domingo was made by Schomberg, who mentions the mining of gold by the natives; he refers to certain districts as resembling some parts of California. Since his time many efforts have been made to find the reefs or veins to which he referred. They are supposed to have been there, but no one has yet located any auriferous vein.

About 15 or 16 years ago an English engineer reported favorably on a Santo Domingan concession held by some Corsicans; on the strength of this report a Franco-English company was formed to work the property. There were unreliable reports of a "true fissure vein.". In the vicinity there was said to be payable copper, and all over the republic concessions were granted to work every known metal or mineral. A strong point was the undisputed fact of the existence of alluvial gold in many parts of the island. It was said that this gold came from reefs, and it was to test this that the writer went out to the West Indies.

In those days there were few English-speaking people there; the most of the trade was in the hands of Germans and Corsicans. No mining was carried on; the bulk of the business done was in sugar, cocoa, wood, etc. The new mining company had built a small camp on the banks of the Taina, close to its concession.

In the vicinity of the latter a good deal of washing had been carried on, and in one hole it was stated a $375 nugget was found; but further endeavor failed to get more than the small quantities washed by the native women and which then sold by a weight called "tomin."

The reef, said to be a "true fissure vein," was what von Cotta would call a "quartzit lager," and carried none of the precious metals.

Copper I found in many places, but nowhere in payable quantity, and always free from gold and silver. It occurred as an impregnation which ran generally under 0.5% Cu. It occurs under somewhat similar conditions near Ponce, Porto Rico.

After I left, some French engineers took up the concessions, but their results were disappointing. My impression is that the country is not likely to prove rich in minerals of any kind; my experience has been varied and extensive. Nevertheless, alluvial gold has been found where no veins exist, and impregnations of carbonate of copper are known in many parts of the world where copper mining is impossible. Some day someone may find a rich mine of gold or copper in the dusky republic, but of that, may I be permitted to say: "A ha'e ma doots."

JNO. MILLER.

Glasgow, Scotland, Aug. 1, 1905.

Zinc Mining in Tennessee.

Sir—The last year has witnessed some active operations in the way of deep mining in the Tennessee zinc district. There are three distinct fields, namely, the Lead Mine Bend field in Union county, the Straight Creek field in Claiborne county, and the Holston River field in Knox and Jefferson counties.

In the first two fields a great deal of work has been done, showing a blanket vein of high-grade zinc associated with lead. In the Straight Creek field, the Tennessee Zinc Co., of Cincinnati, O., is working on the lower levels and is mining ore carrying 15% zinc and 2% lead; this company has recently contracted for a 100-ton concentrating plant, and should meet with success.

The greatest development work has been done in the Holston River field; the Roseberry Zinc Co. has been continuously drilling its property, with both day and night shifts, for something over a year; it has demonstrated that it has a rich vein at a depth of 158 ft. and extending to 202 ft., which is the extreme depth drilled. It now has a shaft down 172 ft., and is drifting off on a 14-ft. face carrying from 12 to 15% zinc. It is producing concentrate running better than 60%, and is making a close saving. This company is entitled to great credit for the pertinacity with which it has clung to this proposition in the face of many discouraging circumstances.

The Holston Zinc Co. (which joins the Roseberry property) has also done a large amount of drilling, proving that the Roseberry vein extends through its property; this company has recently let a contract for sinking a shaft to a depth of 200 ft., and the work is progressing favorably. This company has a concentrating plant; now that it is assured of a constant supply of ore, it will undoubtedly meet with success.

This field (the Holston river) extends from a point 4 miles east of Knoxville for over 20 miles, and paralleling the Holston river and the Southern railway. Along this entire field considerable prospecting has been done, showing that the ore is continuous; the ore is entirely free from lead and carries less than 1% iron, with no other impurities. It is not likely that these properties will be allowed to remain idle very long, now that the efforts of the two companies have proven the great merit of this field; I believe that this will develop into a great mining camp. The properties are held at reasonable figures; shipping facilities are of the best; fuel and labor are cheap; all this makes a good combination, and one which will certainly be utilized in the near future.

The prospects are good for some valuable developments in the lead field lying south of the river, beginning with the property of the Valley Mount Lead Co., and extending through a goodly portion of Blount county. The Valley Mount Lead Co. has done a large amount of work in the way of cuts, tunnels, etc., and is now making arrangements for drilling its property; this is a disseminated proposition similar to that of the southeastern Missouri ore; but it undoubtedly carries a higher percentage of lead.

At several points in Blount county, and

near the line of the Louisville & Nashville railway, more or less development work has been done; but as a rule, only enough to show the existence of lead. At the Cedar Ridge mine, however, some work has been done in the way of cuts, shafts, etc., and the indications are that the drill will prove this to be a valuable property.

X. Y. Z.

Knoxville, Tenn., Aug. 11, 1905.

Pig-Iron Production in Canada.

The American Iron & Steel Association has received direct from the manufacturers the statistics of the production of pig iron in Canada in the first six months of 1905. The figures show a large increase as compared with either of the two halves of 1904, as will be seen by the following table, which gives the production by fuels, in gross tons, in half-yearly periods.

	1904.		1905.
	First Half.	Second Half.	First Half.
Coke.....	111,840	139,831	188,541
Charcoal.....	8,803	10,468	21,665
Total.....	120,643	150,299	210,206

The Canadian production of pig iron in the first half of 1905 was the greatest in any half year in the history of the Dominion, exceeding by 48,453 tons that of the last half of 1902, the next highest half year, when 161,753 tons were made. It was also greater than the production of any whole year prior to 1901. Down to that year the production of pig iron in Canada never amounted to 100,000 tons in any calendar year.

The production of bessemer pig iron in the first half of 1905 amounted to 63,785 tons. There was no production of bessemer pig iron in the first half of 1904, and only 26,016 tons were made in the second half of that year. The production of basic pig iron in the first half of 1905 amounted to 68,378 tons, against 28,981 tons in the first half of 1904 and 41,152 tons in the second half.

The unsold pig iron held by Canadian manufacturers on June 30, 1905, none of which was intended for their own consumption, amounted to 35,629 gross tons, as compared with 35,119 tons on Dec. 31, 1904, and 36,868 tons on June 30, 1904. Of the unsold stocks on June 30, 1905, a little less than 6,500 tons were made with charcoal, the remainder being coke iron.

On June 30, 1905, Canada had 16 completed blast furnaces, of which 11 were in blast and five were idle. Of this total 11 were equipped to use coke and five to use charcoal.

During the first half of 1905 the total number of furnaces in Canada actually in blast for the whole or a part of the period was 13, of which eight used coke and five used charcoal.

The first user of steam heat was James Watt, who in the winter of 1784-85 employed it for warming his study.

New Books.

Annual Report of the Under Secretary of Mines, Queensland, for the year 1904.

Electrolytische Verzinkung. By Sherard Cowper-Coles. Translated into German by Emil Abel. Pages, 37, with 36 figures. Vol. XVIII of the *Monographien über angewandte Elecktrochemie.* W. Knapp, Halle, Germany. 1905. $0.65 in New York.

Die electrolytische Chloratindustrie. By John B. C. Kershaw. Translated into German by Max Huth. Pages, 123, with 39 figures. Vol. XIX of the *Monographien über angewandte Elecktrochemie.* W. Knapp, Halle, Germany. Price, $1.50 in New York.

L'industrie aurifère. By David Levat. Paris, 49 quai des Grands-Augustins: Vve. Ch. Dunod, 1905. Pages, 920, with 253 illustrations. 8vo. Price, 30 fr., paper.

Contents — General considerations. Properties of gold. Placers. Prospecting and valuation. Methods of exploitation. Quartz mining. Free milling ores. Treatment of refractory ores. Examples from practice.

The above summary recites only the grand heads of the work, which treats of the methods of gold production and extraction in all their phases, and as practiced in all parts of the world. As in any work of so ambitious character there is necessarily some lack of uniformity, but in the main the subject has been well treated, and there is a good deal, especially that relating to gold mining in Siberia, which is better than any previously existing literature.

The high reputation of M. Levat as an engineer and the fact that he has herein presented the results of a long, active and varied experience in the field of practice, insure a warm appreciation of his treatise, which we consider a valuable contribution to technical literature.

The Law Relating to Oil and Gas. By W. W. Thornton. Pages, cxi + 918. Cincinnati, O. The W. H. Anderson Co., 1904. Price, $5, leather.

Contents—Historical sketch. Legal status of oil and natural gas. Oil and gas leases. Duration of lease. Forfeiture of lease. Assignment and subletting of lease. Rents and royalties. Who may make a lease. Tenants for years. Tenancies for life; dower. Co-tenants. Contracts for a lease. Adverse possession; statute of limitations. Reservation and exception. Partnerships. Mechanics' liens. Mortgages. Transportation and eminent domain. Transportation of oil and gas. Legislative and municipal control. Contracts for municipal lighting. Monopolistic grants and contracts. Streets and highways. Municipality supplying gas. The gas company and consumer. Meters and mixers. Fixtures. Nuisances. Leaks and explosions. Injuries negligently caused by oil and gas. Insurance. Taxation. Miscellaneous.

Anyone who has had experience in the petroleum and natural-gas industries is aware of the multiplicity of legal questions which arise concerning them, and the lack of any ready and even fairly complete work of reference. The present work consists chiefly of a systematized digest of the decisions of the courts on questions pertaining to these industries. In some cases, where the questions have received variant decisions by the courts of different States and have not yet been passed on by a United States court, the author has given his own opinion "for what it is worth." In arrangement, annotations, etc., the usual form for legal works is followed. The breadth of treatment is amply indicated by the table of contents.

Aside from the interest which mining men have in the petroleum and natural-gas industries from the standpoint of producers, smelters and metallurgical engineers are deeply interested in natural gas especially, which they use extensively as fuel in West Virginia, Pennsylvania, Ohio, Indiana and Kansas. The zinc-smelting industry of Kansas is based entirely upon it. The work under review, which appears to be creditably prepared, will be highly useful to the smelters, who are thus interested, as well as to the large number of producers.

The Sayre Colliery, Pennsylvania.

The Lehigh Valley Coal Co.'s improvements near Mount Carmel, Pa., are in keeping with the present practice of concentration of plant. The new Sayre colliery of this company will prepare all the coal that was formerly run over the old Mount Carmel and Sioux breakers; the latter breaker was recently destroyed by fire.

The shaft at the Sayre is one of the largest in the region. It is sunk to the bottom of the basin and is a six-compartment shaft to the top seams. The first 84½ ft. is concreted; it goes through rotten rock and the lower part of the concrete lining is heavy, to resist pressure. There are four hoistways, one airway and one pumpway; the rock dimensions of the shaft are 14 ft. 2 in. by 50 ft. 10 in. The two conical drum hoisting engines are 30 by 48 in. and 24 by 48 in., respectively.

The 1,500-ton breaker is to be erected on level ground and is of the low type; the dump is 110 ft. above the loading tracks. It will have 32 Lehigh Valley jigs and the same number of shaking screens. A special feature about the breaker is re-screening all coal after it is prepared and just before it goes to the pockets for shipment. This work is done by six screens, which take the place of the loading lip screens.

Questions and Answers.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc. Preference will be given to topics which seem to be of interest to others beside the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

Zinc Smelters.

Please tell me where I can obtain names of zinc smelters in Wales and Belgium.

C. T. P.

Answer.—"Production and Properties of Zinc," by W. R. Ingalls, published by ENGINEERING AND MINING JOURNAL, price $3, gives the names and addresses of all the zinc smelters of Europe, as well as of the United States.

Small Blast-Furnaces.

Where can I obtain plans and specifications for a 10-ton copper matte smelting furnace? W. A. R.

Answer.—Any manufacturer of smelting furnace equipments will prepare for you plans and specifications for such a furnace if you contemplate erecting one. We do not know of any publication which would give you what you want.

Unless you have some particular object in view, the installation of a smelting furnace of so small capacity would be entirely inadvisable. It can be operated. The Mexicans smelt in shaft furnaces about 8 by 8 in. We have employed an 18-in. circular furnace for experimental purposes. Thirty-five years ago furnaces of 24 by 24 in. used to be employed for lead smelting at Eureka, Nev., putting through about 8 to 10 tons of charge per day.

Operation is, however, one thing, and profitable operation is another. With a 10-ton furnace in copper matte smelting the chances are you would lose money.

Petroleum in Copper Smelting.

Has petroleum been successfully employed as a fuel in copper smelting?

R. A. N.

Answer.—If you refer to smelting in the reverberatory furnace, wherein the only function of the fuel is to generate heat, petroleum has been successfully employed, and its use is likely to increase in parts of the world where it can be obtained more cheaply than coal.

If you refer to smelting in the blast-furnace, petroleum has not yet been successfully employed. Attempts have been made to introduce it through the tuyeres, and it is possible that this may some day be partially successful for certain purposes, although there is no indication of such at the present time. It is a question that does not engage any considerable attention, because anyway coke can never be entirely replaced. It is necessary as a reducing agent, when oxides have to be reduced, ferric to ferrous, for example, and in other processes, pyrite smelting, for example, its presence is necessary for mechanical reasons. Petroleum can not be made to serve as a substitute in those functions.

New Blast Furnaces.

The report of the American Iron and Steel Association shows that during the first half of 1905 eight new furnaces went into blast for the first time. Four of these were completed during the half-year, and four near the close of 1904. These furnaces, with their yearly capacity, were as follows:

New Furnaces.	Capacity, Tons.
Lackawanna No. 1, Buffalo, N. Y., coke	80,000
Ensley No. 6, Ensley, Ala., coke	100,000
Woodward No. 3, Woodward, Ala., coke	90,000
Lorain No. 4, Lorain, O., coke	150,000
Buffalo & Sus., Buffalo, N. Y., coke	112,500
Donora, Pa., two stacks, coke	365,000
Prior Lake, Boyne City, Mich., charcoal	29,000
Total yearly capacity	926,500

There were 7 furnaces definitely abandoned, or dismantled, during the half-year, as follows:

Furnaces	Capacity.
Hudson county, Harrison, N. J., anthracite	10,000
Allentown, Pa., two stacks, anthracite.	60,000
Northside, Sharpsville, Pa., coke	18,000
New Chattanooga, Tenn., coke	30,000
Gadsden No. 1, Ala., coke	50,000
Peninsular, Mich., charcoal	10,000
Total capacity	178,000

It will be seen that the abandoned furnaces were generally of small capacity. The Hudson county furnace was the only one of its kind in this country. It was owned by the New Jersey Zinc Company, and made spiegeleisen from the manganiferous residuum from the Franklin, N. J., zinc ores.

There are 11 new furnaces now under construction, as follows:

Furnaces.	Capacity.
Lackawanna Nos. 5 and 6, Buffalo, N. Y., coke	160,000
Monongahela C., McKeesport, Pa., coke	150,000
Cambria No. 7, Johnstown, Pa., coke.	150,000
Chattanooga, Tenn., Coke	55,000
Etowah No. 1, Gadsden, Ala., coke,	65,000
Mingo No. 4, Mingo, O., coke	145,000
Haselton No. 2, Youngstown, O., coke	140,000
Minnequa F, Pueblo, Colo., coke	125,000
Center, Trigg county, Ky., charcoal.	3,000
Cadillac, Mich., charcoal	40,000
Total capacity	1,033,000

The report comments on these figures as follows: "Since Dec. 31, 1904, there have been added to the active blast-furnaces of the country 1 new charcoal and 7 new coke-stacks, with a total annual capacity of 926,500 tons of pig iron, of which 29,000 tons were charcoal and 897,500 tons were coke; and during the first six months of 1905 the country has lost 7 furnaces by abandonment and dismantlement, 1 charcoal furnace, 3 anthracite-coal and coke furnaces, and 3 coke furnaces, with a total annual capacity of 178,000 tons. This is a gain in furnaces of but 1 stack, but a gain in capacity of 748,500 tons. In the figures of gain no allowance has been made for furnaces which, since the opening of 1905, have been rebuilt or reconstructed and have had their capacity increased.

"When completed, the 11 building or revived furnaces will have a combined annual capacity of about 1,033,000 tons. Possibly 5 of these furnaces, with an annual capacity of about 303,000 tons, will be ready for blast before the close of the last half of this year. The 6 remaining furnaces will not be completed and ready to blow in until after the opening of 1906, if then."

American Coal in Canada.

Under date of June 20, 1905, United States Consul Holloway (Halifax, Nova Scotia), transmits the following: "During the last fiscal year, 4,252,333 tons of soft coal were imported into Canada from the United States, practically all of which was taken by Ontario. Some of this coal was produced in Ohio and shipped across Lake Erie in vessels; the remainder was Pennsylvania coal, which entered Canada by rail via the Suspension Bridge route. After the duty has been paid, this coal can still be sold at a considerably lower figure than that for which Nova Scotia product can be delivered, owing to the cost of transportation and the royalty exacted by the government of Nova Scotia from its coal producers upon every ton of coal mined in consideration of the protection afforded them by the Dominion tariff.

"From this latter feature arises much of the dissatisfaction of the Ontario steam users; they assert that they pay 67c. a ton duty and get no return, as no Ontario industry is benefited by the tax which all have to pay. Neither do the Nova Scotia mine owners derive any advantage from the duty on this tonnage, as practically none of their coal goes to Ontario, and, therefore, their interests would not be adversely affected if coal from the United States were admitted into that province free of duty. Petitions have been made to the Nova Scotia government asking that a remission of this fee be made on coal shipped west of Montreal; but such requests have always been refused. If this royalty did not exist, the Nova Scotia coal might possibly reach some parts of Ontario, and to that extent displace the Pennsylvania and Ohio product.

"This state of affairs has set the Ontarion manufacturers discussing the question as to why they should continue to pay a duty on United States coal for the benefit of Nova Scotia, when that province refuses to put its own coal within their reach, and they insist that there will be no cessation of efforts to secure a more equitable arrangement."

If a piece of timber is painted so that there is no chance for it to season, a process of fermentation takes place, and it will rot, although the effect may not become quickly manifest.

South Wales Coalfields.

Governmental inquiry on the part of Great Britain into reported efforts of a foreign syndicate to acquire possession of the South Wales coalfields has recently attracted attention to these celebrated mines. Certain small anthracite collieries in Wales are already in the possession of French and Belgian capitalists, and an attempt to increase the holdings of these companies may be responsible for the present rumor.

The *Colliery Guardian* states that there is no insuperable obstacle in the way of a foreign syndicate acquiring possession of some of the large South Wales anthracite collieries, which are owned by limited liability companies whose shares are frequently speculated in through the London Stock Exchange. However, it is intimated, on the assurance of the Prime Minister, that Great Britain would not remain indifferent to any transaction which would hand over to a foreign government the unique resources of the navy of the United Kingdom. Smokeless coal is a valuable asset to a nation in time of war.

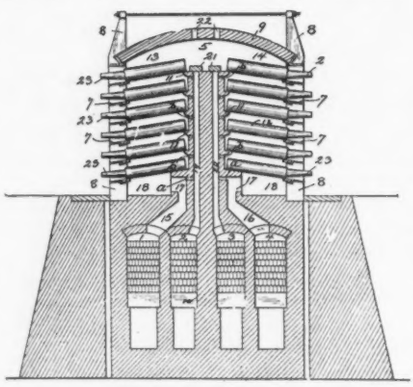
Method of Testing Coal.

A quick and useful method of determining the amount of slate in the small sizes of prepared coal is employed by the Delaware, Lackawanna & Western Coal Department at its mines in Pennsylvania. When the railroad car is being loaded, samples of coal are collected which aggregate 10 lb. About one-quarter of this 10-lb. sample is set apart at the testing house for the slate determination. The method is as follows:

A solution is prepared by mixing sulphuric acid with water until the mixture shows specific gravity of 1.7 by hydrometer test. This solution is placed in an earthenware jar. A perforated copper vessel, of several times the capacity of the coal sample, is suspended in the solution. On the sample being poured into the copper receptacle and agitated, the slate sinks, while the coal floats on the solution. The coal is skimmed off, washed, weighed and compared with the total weight of the coal and slate. This leaves nothing to the discrimination of an inspector as to what should be classed as slate.

A New Zinc Distillation Furnace.

Herman and Julius W. Hegeler have patented (U. S., 792,773, June 20, 1905) a modification of the Siemens-Belgian furnace, which resembles the Neureuther modification in having vertical channels in the middle wall; but these channels communicate only with the gas checkers, the air checkers communicating with the combustion chamber in the usual manner of this type of furnace. The effect of the Hegeler modification is to introduce the entire supply of air beneath the lowest row of retorts, the gas being introduced through ports in the middle wall at intervals higher up. This arrangement effects therefore a combination of the principle of the long furnaces used at Lasalle, with that of the Siemens furnaces used at



Peru. Its purpose is of course to maintain an equal temperature throughout the combustion chamber, heating the lowest and highest rows of retorts to substantially the same degree. Openings are arranged in the arch of the furnace, in the conventional manner, for clearing out obstructions in the gas channel. The new furnace has not yet been tried practically.

Patents Relating to Mining and Metallurgy.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by THE ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

796,423. CONSTRUCTION OF JOINTS IN TUBINGS FOR SHAFTS AND TUNNELS.—Rudolf Hoffmann, Styrum-on-the-Ruhr, Germany.

796,459. PROCESS OF TREATING SILOXICON TO PRODUCE THEREFROM REFRACTORY ARTICLES, SUCH AS BRICK AND THE RESULTING PRODUCT.—Bert Seaboldt, Salt Lake City, Utah, assignor to Chester Thorne, Tacoma, Wash.

796,485. ROTATING SCREEN.—William W. Windle, Millbury, Mass.

796,489. CENTRIFUGAL PUMP.—Peter Albertine, Winterthur, Switzerland.

796,489. ART OF MINING COAL.—Clarence R. Claghorn, Vintondale, Pa.

796,499. ART OF MINING COAL.—Clarence R. Claghorn, Vintondale, Pa.

796,503. APPARATUS FOR TREATING SLIMES IN ORE REDUCTION.—Gustavus A. Duncan, Deadwood, S. D.

796,526. GRINDING-ROLL.—George B. Nutt, Pittsburg, Pa.

796,541. HOISTING-MACHINE.—Webster A. Tompkins, Portland, Ore., assignor of one-half to Henry L. Pittock, Portland, Ore., and one-third to Albert W. Cochran, Portland, Ore.

796,553. ORE-JIG.—Mercellus P. Baugh, Pueblo, Colo.

796,554. ORE-JIG.—Marcellus P. Baugh, Pueblo, Colo.

796,585. APPARATUS FOR TREATING REFRACTORY ORES.—Julius Leede, Baltimore, Md.

796,632. GAS-GENERATING PLANT.—Thomas F. Fitzsimmons, Brooklyn, N. Y.

796,639. CLAY-PULVERIZING AND STONE-SEPARATING MACHINE.—James P. Hall, Tuscola, Ill.

796,670. PROCESS OF MAKING GAS.—Donald McDonald, Louisville, Ky.

796,747. EXCAVATING-MACHINE.—Wallace Marshall, Lafayette, Ind.

796,753. MACHINE FOR TREATING ORES.—John R. Parks, Spokane, Wash.

796,754. PROCESS OF TREATING ORES.—John R. Parks, Spokane, Wash.

796,780. APPARATUS FOR PLACER-MINING.—John L. Weaver, Boise, Idaho.

796,849. PROCESS FOR THE TREATMENT OF ORES CONTAINING ANTIMONY.—John S. MacArthur, Glasgow, Scotland.

796,856. FURNACE.—Edward O. C. Ord, Washington, D. C.

796,870. MINER'S LAMP.—William J. Rump, Ravine, Pa.

796,890. ROCK-DRILL.—John T. Blackett, Guisborough, England.

796,891. ROCK-DRILL.—John T. Blackett, Guisborough, England.

796,917. APPARATUS FOR PRODUCING GAS.—Johann Luhne, Aix-la-Chapelle, Germany.

796,940. CONCENTRATING-TABLE.—Thomas F. Sheridan, Chicago, Ill.

796,953. EXPLODER.—Edgar H. Atkins, Richmond, Va.

796,956. FUME-ARRESTER.—Selden I. Clawson, Salt Lake City, Utah.

796,958. SAFETY DEVICE FOR HOISTING MECHANISMS.—William Cooper, Denver, Colo.

796,970. METHOD OF EXTRUDING METAL.—William Hoopes, Pittsburg, Pa., assignor to the Pittsburg Reduction Company, New Kensington, Pa., a corporation of Pennsylvania.

796,971. CONTINUOUS HEATER FOR FURNACES OF HIGH TEMPERATURE.—Luke Houze and Charles J. Hurrle, Stockton, Cal.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week ended July 22, 1905.

13,565 of 1904. REDUCTION OF ORES.—C. Castiglione and L. Calastretti, Milan, Italy. Reducing sulphates to sulphides by heating in presence of a reducing agent, such as coal gas or water gas.

16,517 of 1904. GALVANIZING FURNACE.—J. C. Broadbent, Huddersfield, and G. A. Herdman, London. Improvements in the furnaces for galvanizing with zinc powder, with the object of distributing the heat more evenly.

17,849 of 1904. ATTACHMENT FOR MINE CAGES.—G. Williams, Bolton. Additions to the structure of mine cages, to be used when inspecting the walls of the shaft.

18,653 of 1904. ROCK-DRILL.—J. E. H. Grose, Johannesburg, S. A. Improvements in the valves of rock-drills.

19,882 of 1904. DRILL STEEL.—C. Bornet, Paris. Method of making hollow rock-drills, to be used when a stream of water is required for laying the dust.

28,532 of 1904. UTILIZATION OF CULM.—H. Kupper, Huttrop-Essen, Germany. Process for utilizing fine coal that is at present lost in the coal-washers.

14,359 of 1904. ATTACHMENT FOR MINE CAGES.—C. Sugden, Stafford. Improved grip-blocks for attaching mine cages to the guide-ropes in case of failure of the hauling rope.

14,704 of 1904. PULVERIZER.—R. H. Wheeler, London. In pulverizers in which the breaking is done by rapidly revolving hammer-heads, arrangements for preventing the choking of the machine.

14,757 of 1904. PURIFICATION OF BLAST-FURNACE GAS.—B. H. Thwaite, London. Improvements in the inventor's process for purifying blast-furnace gases and making them available for use in gas-engines.

18,437 of 1904. ELECTRIC FURNACE.—J. F. Bottomley and A. Paget, Newcastle-on-Tyne. Electric furnace for forming articles out of fused silica.

19,433 of 1904. ATTACHMENTS FOR MINE CAGES.—J. Moody and J. Clegg, Huddersfield. Improved grips for holding up mine cages when the hauling rope breaks.

4,224 of 1904. ATTACHMENT FOR MINE CAGES.—A. West, Leeds. Improved connection between hauling rope and mine cage, to prevent overwinding.

3,691 of 1905. TANTALUM CASTING.—Siemens & Halske, Berlin. Electrical method of casting wearing parts of machinery from tantalum and its alloys.

8,030 of 1905. ACETYLENE SAFETY-LAMP.—C. Lindner, Glatz, Silesia. Improved miner's safety-lamp, using acetylene.

Personal.

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

Mr. George W. Rose, of Salt Lake City, was in Denver a few days ago.

Mr. Ivan de Lashmutt, of Tucson, Ariz., was in Denver last week.

Mr. W. C. Thomas has returned to Salt Lake City from Greenwood, B. C.

Mr. Walter Harvey Weed, of Washington, D. C., was a visitor in New York last week.

Prof. H. E. Wilson, manager of several mines in White Pine, Colo., is in St. Louis on business.

Capt. Fremont Stokes, of Pittston, Pa., is now engaged in opening a coal mine at Spadra, in Arkansas.

Mr. S. M. Bamberger, manager of the Fortuna mine, at Bingham, has returned to Salt Lake from Alaska.

Mr. L. C. Huck, president of the Annie Laurie mine, of Utah, is making an inspection of that property.

Mr. Seymour H. Bell, of Sumpter, Ore., passed through Baker City this week on his way to Weiser, Idaho.

Mr. R. C. Gemmell, of Salt Lake City, has gone to Spain to make mine examinations for an English company.

Manager Fred T. Kelly, of the I. X. L. mine, has just returned from a business trip to Chicago and New York.

Mr. W. G. Swart, of Denver, Colo., has gone to Salt Lake to supervise the starting of a Blake separating plant.

Mr. Theodore L. Lammers, of Duluth, Minn., has gone to Colorado to examine mining property in Gilpin county.

Mr. August Mathez arrived in Salt Lake this week and will do some professional work for Samuel Newhouse.

Mr. J. C. Putney, of Denver, and Mr. H. T. Benson, of Ollinghouse, Nev., visited mines at Vulcan, Col., recently.

Mr. Edward W. Sebben returned to Denver a few days ago from a professional trip to Nevada and California.

Mr. L. P. Gratacap, curator of mineralogy, Museum of Natural History, New York, has been spending the summer in Newfoundland.

Mr. C. F. Moore, formerly with the Old Dominion Copper Co., Globe, Ariz., is now with the United States Mining Co., Salt Lake City.

Mr. Howard D. Smith, of the firm of Janin, Stebbins & Smith, of San Francisco, was in Colorado last week on professional business.

Mr. Henry E. Wood, of Denver, Col., has returned from Oregon, where he has been investigating gold mines and platiniferous black sands.

Mr. Philip Argall, of Denver, Col., is examining mines in New Mexico and Arizona. He will return to Denver about September 1 next.

Mr. Hermann A. Keller, of New York, went to Goldfield, Nev., August 10, to examine mines. He expects to return early in September.

Mr. James Douglas, of the Copper Queen Consolidated Co., is in Europe, partly on business and partly for rest. He will return early in October.

President George W. Daines, of the Daines Mining & Milling Co., who has been in Indianapolis some time, is expected to return to Baker City in August.

Mr. C. T. Durell has resigned the management of the Gold Reef Mine, at Gilt Edge, to accept the position of manager of the Spotted Horse mine, at Maiden, Montana.

Mr. Charles Olden, of London, was in New York this week. He expects to visit several mines and mills in this country. Mr. Olden has recently returned from Borneo.

Mr. H. J. Carnegie Williams, of London, England, is in Toronto in connection with the organization of the Copper Mines & Smelter Co., Ltd., to operate the Bruce copper mines.

Mr. J. T. Hawkins, mining engineer, of Cripple Creek, Col., has been appointed delegate to the Trans-Mississippi Congress in Portland, Ore., and will be in that place for a few days.

Manager H. T. Hendryx, of the Geiser-Hendryx Co., operating the Midway and Tabor Fraction and other properties in Baker county, Oregon, has gone to Portland, to arrange for final payment on another property.

M. Herault, of La Praz, France, inventor of the Herault system of electric smelting, is now on his way to Canada in connection with the experiments in electric smelting which are to be made at Sault Ste. Marie.

Mr. W. H. Nutting has resigned the position of superintendent of the Bingham Consolidated Smelter, at Bingham Junction, Utah. He is succeeded by Mr. S. W. Gormley, formerly connected with the Washoe smelter at Anaconda, Montana. Mr. Nutting has gone to California.

Mr. L. C. Dennis, secretary of the Stampede Mining Co., of Tacoma, which owns the Mayflower property in the Cornucopia district, has just returned to headquarters in Tacoma, after a trip to the property and a consultation with Manager Boggs in regard to the erection of a new mill.

Mr. N. D. Daru, a Hindoo, and a graduate of the Royal School of Mines, London, England, has been attached to the staff of the Dominion Geological Survey for two years for the purpose of studying the methods pursued by the Survey. On his return he will be employed on the Geological Survey of India.

Obituary.

Alan W. Wood died in New York, August 13, aged fifty-five years. He was for many years a member of the well-known firm of W. Dewees Wood & Co., of Pittsburg, but retired from business four years ago.

Dr. William C. Tilden, formerly a noted chemist of Washington, died in that city August 2, aged sixty years. He was at one time prominent in Government and other work, but for fifteen years past had done no active work on account of failing health.

T. T. Hillman, president of the Pratt Consolidated Coal Co., the largest independent coal company in Alabama, and also interested in iron and steel industries in the Birmingham district, died August 4 at Atlantic City, N. J., from an illness of many months' duration. His remains were interred this week at Nashville, Tennessee.

Societies and Technical Schools.

Appalachian Engineering Association.—The object of this new society is explained by the following extract from the address of President F. W. Callaway at the meeting held at Williamson, W. Va., in July: "The association has adopted in its constitution a very comprehensive, but necessarily brief, statement of the object of its existence, and it is my purpose to expand the ideas contained therein in an endeavor to give the full meaning and intention of the authors of that document.

"The name chosen by the association was a particularly appropriate one. The word 'Appalachian' embraces all that territory over which it is the intention that the association should extend its influence. The wide geographical distribution of those desirous of joining with us demonstrated that this was a title by no means too ambitious. The desire throughout this region for an organization of this kind, devoted particularly to this portion of our country and its special needs, as expressed in letters from all sides, fully warranted its organization. Indeed, this widespread interest is the best guarantee we could ask for the permanency and continued success of our association.

"The designation 'Engineering' in the name of the association was intended to be in its broadest sense—to be all-embracing—in its idea of including every eligible person connected with practical or professional engineering work in any way of its many branches. The association hopes to enroll many of those men engaged in the direction or superintendence of actual engineering work, and to include among its professional members representatives from every branch of engineering—civil, electrical, mining, mechanical and architectural, or specialists under subdivision of these general heads."

Trade Catalogues.

The Ludlow-Saylor Wire Co., St. Louis, Mo., sends us its catalogue No. 31 of wire cloth and miners' candlesticks.

The Northern Electrical Manufacturing Co., Madison, Wis., sends us its catalogue of "Spherical" machines.

"Induction Motors for Constant Speeds" is the title of the bulletin of the Commercial Electric Co., Indianapolis, Ind., describing this type of machine. It is standard size.

The "Morgan Continuous Gas Producer" is the title of the Morgan Construction Co.'s (Worcester, Mass.) new catalogue. It is of standard size, is well illustrated and admirably made up.

"What Others Say" is the title of the W. G. Leale Co.'s reprint of various articles on the subject of pumping by compressed air. The company's address is 119 Mission street, San Francisco, Cal.

The "Emerson Monthly" for August has the usual "bargain list" and an article on the automatic starting single phase induction motor. It is published in the interest of the Emerson Electric Manufacturing Co., St. Louis, Mo.

The "Radialax" coal cutter is described in the catalogue of the same name issued by the Ingersoll-Sergeant Drill Co., 11 Broadway, New York. The catalogue is, like all of this company's excellent publications, of standard size.

We have the paper weight sent out by the Oliver Manufacturing Co., Knoxville, Tenn. It is a pair of diminutive self-oiling car wheels, mounted on an axle support; a reproduction in miniature of one of the company's products.

In a pamphlet issued by the Orford Copper Co., 43 Exchange Place, New York, and entitled, "Nickel Steel: Its Properties and Applications," a reprint of A. L. Colby's paper before the American Society for Testing Materials is published.

"Cahall," the new edition of the Aultman & Taylor Machinery Co.'s (Mansfield, O.) catalogue is well illustrated and substantially bound. The additional material increases the value of the publication and makes it more likely to be preserved. The book is 6 by 9 in. in size.

The new edition of "Smelting Practice and Equipments," by the Colorado Iron Works Co., Denver, Colo., is as excellent a publication as the previous issues. The new material causes an increase in thickness. It is so good in other respects that it is a pity advantage could not have been taken of the revision to have made the catalogue of standard size.

The Link Belt Machinery Co., Chicago, Ill., sends us its new "General Catalogue." The book, for it is an unusually well made volume, is of standard 6 by 9 in. size, in buckram binding and elaborately illustrated. The dimension drawings are of value and the index is good. This volume is not apt to see the waste basket; it belongs in the class of catalogues that become engineering literature.

Industrial.

The Holderman filter tank system is being adopted in the Gold-dust Mining Co.'s mill at Leesburg, Idaho.

The Rapid-Economy Stamp Mill Co., of San Francisco, Cal., is installing a number of its stamps at the Fern Leaf mine in Trinity county, California.

The Chuckawalla Mining Co., of Los Angeles, has contracted with the Rapid-Economy Stamp Mill Co., of San Francisco, Cal., for the erection of a Richards rapid-economy stamp mill upon the property.

The Wellman-Seaver-Morgan Co., Cleveland, Ohio, has established a branch office at No. 216 Dooly Block, Salt Lake City. Harry V. Croll has been appointed manager, and inquiries addressed to the Salt Lake City office will have his personal attention.

The Sullivan Machinery Co. is making some important additions to its manufacturing plant at Claremont, N. H., in order to keep pace with the rapid growth of business in air compressors, coal cutters, rock drills and other mining and quarrying machinery. The improvements comprise six new buildings, practically doubling the present plant.

The S. H. Supply Co., Denver, Colo., has made the following recent shipments: Complete 50-ton concentrating plant with No. 2 Wild mill to Arizona; 50-ton cyanide plant with No. 2 Wild mill to New Mexico; two No. 1 Wild mills, which are suitable for mule-back transportation, to Mexico; No. 3 Wild mill to California; 75 h.p. Lidgerwood double-drum hoist and necessary boiler capacity, with all supplies, to Mexico.

The report of the American Iron & Steel Association gives the following list of the blast furnaces in the Dominion on June 30 last:

The Dominion Iron & Steel Co., of Sydney, N. S., had 2 of its 4 coke furnaces in blast on June 30. One of the idle furnaces is to resume about October 1.

The Nova Scotia Steel & Coal Co., of New Glasgow, N. S., operated its new furnace at Sydney Mines, Cape Breton, for 180 days during the first half of 1905 and was running it on June 30. The company has virtually abandoned its Ferrona Furnace, at Ferrona.

Messrs. John McDougall & Co., of Montreal, had 1 of their 2 charcoal furnaces at Drummondville in operation on June 30. During the first half of the year both furnaces were running, one for 112 and the other for 49 days. The idle furnace may resume next winter.

The Algoma Steel Co., Ltd., of Sault Ste. Marie, blew in its No. 1 furnace (charcoal) for the first time on March 1, 1905, and it was running on June 30. Its No. 2 Furnace (coke) was in operation during the whole of the first half of 1905. The construction of furnaces Nos. 3 and 4 (coke) was not resumed in 1905.

The Deseronto Iron Co., of Deseronto, Ontario, operated its furnace on charcoal for 181 days during the first half of 1905 and it was running on June 30.

The Hamilton Steel & Iron Co., of Hamilton, Ontario, was operating its furnace on June 30. It ran for 150 days in the first half of 1905 on basic and foundry pig iron.

The Canada Iron Furnace Co., of Montreal, had its Radnor and Midland furnaces in operation on June 30. Radnor (charcoal) ran for 113 days and Midland (coke) for 167 days during the first half of the year. Bessemer pig iron was chiefly made at Midland.

The Northern Iron & Steel Co., of Collingwood, Ontario, did no work whatever in the first half of 1905 on the furnace for which excavations were made in 1902 but upon which work was suspended in 1903.

The Atikokan Iron Co., Ltd., of Port Arthur, Ontario, broke ground early in August for its new blast furnace at Port Arthur. It will be 75 by 15 ft., will be equipped with 3 Roberts stoves, will use magnetic iron ore from the Atikokan range, which is located about 130 miles west of Port Arthur, and will have an annual capacity of about 30,000 tons of foundry and bessemer pig iron. Coke will be made in ovens near the furnace. The officers are D. D. Mann, president; J. C. Hunter, vice-president; Hugh Sutherland, secretary and treasurer, and Robert R. Jones, general manager.

Construction News.

Readers of the JOURNAL are requested to inform this Department of pending contracts, or of new work projected, giving name and address of the person in charge of the work or project.

Wentworth, Missouri.—J. R. Anthony will erect a concentrating plant near this place.

Elizabeth, Illinois.—The Skeene Lead Co. will let contract for new buildings and machinery.

Norton, Virginia.—The Wise Coal Co. will build 30 new coke ovens and the Norton Coal Co., twenty.

Mexico City, Mexico.—W. H. Baird is purchasing material for a cyanide plant for the Oaxaca mines.

El Tigre, Mexico.—B. F. Graham, Douglas, Ariz., states that it is planned to increase the capacity of El Tigre mill.

Parral, Mexico.—It is understood that the Quebradillas Mining Co. (office in New York city) will install a lixiviation plant.

Silverton, Colorado.—A new 10-stamp mill will be built in the San Juan district at Mastodon gulch for the Sound Democrat mines.

Thomasville, Georgia.—A plant for the manufacture of sand-lime brick is projected at this place. J. H. Merrill can give information.

Columbus, Mississippi.—The Independent Oil & Fertilizer Co. will build and operate a fertilizer plant in connection with the oil mill.

Lead, South Dakota.—The Homestake Mining Co. is about to install a system for treating its slimes. The cyanide plant will also be enlarged.

Scottdale, Pennsylvania.—An addition of 100 ovens is to be made to the plant of the Orient Coal & Coke Co., near Merrittstown, Fayette county.

Republic, Washington.—The Belcher and Winnipeg mines, near this place, are each to install an 8-drill plant. The Belcher Co. will also erect new buildings.

Hawthorne, California.—Another power plant to supply the Bullfrog and Goldfield districts is projected at this place. L. L. Dunn, of the Telluride Power Co., is interested.

Elkin, North Carolina.—The Hiddenite mines in Alexander county are to be reopened. Professor Hidden has purchased adjoining property and will install modern machinery.

Roseburg, Oregon.—The Continental mine, on South Myrtle creek, will build a 50-ton reduction plant. W. B. Stewart is manager. Hoisting machinery is also to be installed.

San Lorenzo, Mexico.—The American-Mexico Mining & Development Co. at this place will soon increase its smelter capacity. It is also expected that a tramway will be built.

Kootenay, British Columbia.—La France Mining Co. will install additional machinery at an early date, and will also probably build a tramway for shipment of ore via Crawfords Bay.

Nashville, Tennessee.—The Charleston-South Carolina Mining & Manufacturing Co. has purchased a site in West Nashville for a fertilizer plant, which is expected to cost $400,000.

Mount Pleasant, Tennessee.—Messrs. E. L. Gregory and W. D. Ruhm, general managers of the Mount Pleasant Fertilizer Co. are seeking a location for a fertilizer plant at Cookeville, Tenn.

Tamaqua, Pennsylvania.—The Philadelphia & Reading Coal & Iron Co. has let contract for pumping engines to reopen the Reevesdale workings. A large breaker will be erected at that point.

Los Angeles, California.—The California Queen Gold Mines Co., of this place, intends to erect a 100-ton mill on its property in the old Picacho mining district, San Diego county, California.

McCurtain, Indian Territory.—It is reported that the Fort Smith & Western railroad will shortly begin the erection of 100 additional coke ovens. A. C. Dustin is president and treasurer, Cleveland, O.

Junior, West Virginia.—The tipple and buildings of the Davis Coal & Coke Co. at this place were recently destroyed by fire, with a loss of $20,000. It is not known whether the company will rebuild or not.

Joplin, Missouri.—T. N. Chenoweth, of this city, and E. R. Perry and Kirby Long, of Coffeyville, Kan., will commence mining operations at once. They will install a pumping plant and make other improvements.

Girard, Alabama.—Work has begun on the new plant of the Chattahoochee Chemical & Mining Co. The factory was destroyed by fire several months ago. The new plant will be larger and of greater capacity.

Joplin, Missouri.—The Atlas Zinc Co., of Pittsburg, Pa., has bought, through P. C. Campbell & Co., of Pittsburg and Joplin, the Brown mine and mill at the latter place. It is probable that alterations in the mill will be effected.

Salida, Colorado.—The Shaumut group of mines in Bonanza district has changed hands. The new holders are installing machinery and modern equipments. W. P. Schleck is general manager. A number of new buildings will be erected.

Annapolis, Maryland.—V. M. Kern has purchased, at this place, a site for the erection of a large chemical manufacturing plant. Brooke Sewell, an English chemist, is understood to be interested. Pier construction will probably be required.

Monclova, Coahuila, Mexico.—W. H. Ellis is having plans made for iron works at this place. A company will be incorporated in New Jersey to undertake the manufacture of steel and pig iron, competing with the existing steel plant at Monterey.

Magdalena, Sonora, Mexico.—The Black Mountain Mining Co., operating in this district, is pushing the construction of its new power plant. This plant is to furnish electric current for the operation of the projected 120-stamp mill at Cerro Prieto, 35 miles away.

Wickenburg, Arizona.—The White Gold Mining Co. is preparing to install a mill of 10 stamps' capacity with a power plant large enough to permit of the addition of 20 stamps more, should it be found advisable. The company is also putting in a cyanide plant.

Belleville, Ontario.—The High Portland Cement Co., of Allentown, Pa., which has purchased 10,000 acres of limestone and clay lands in Thurlow township, 3 miles east of Belleville, Ont., will at once erect a plant and begin manufacturing operations next spring.

Naco, Arizona.—The Naco Smelting & Refining Co. has been organized with Robert Mitchell, president and treasurer; Robert E. Morrison, of Prescott, vice-president; Chas. B. Lewis, secretary. The company will erect a smelter with a capacity of 250 tons a day.

Bishop, California.—The Bishop-Nevada Electric Power & Lighting Co. is to erect an electric plant on Owens river, near this place. It is intended to furnish electric current for power purposes in mining. James Butler, of the Mizpah mines at Tonopah, Nev., is interested.

Cripple Creek, Colorado.—It is reported on good authority that the Golden Cycle Mining Co. will erect a mill to treat its own ore. It has not been announced whether the mill will be built in Cripple Creek or in the valley. L. E. Hill is manager of the property, and A. T. Holman superintendent.

Los Angeles, California.—A combination has been formed with the object of erecting a smelter on the Colorado river in San Bernardino county. The companies comprising it are the Quartz King, Copper Basin, Mt. Whipple, Colorado River Gold and Silver and the White Eagle. The plant is to have 75 or 100 tons daily capacity.

Baker City, Oregon.—Machinery for the new concentrating and reduction plant of the Highland mine is beginning to arrive and will be installed at once. The mill building has just been finished and it is expected to have the new plant in operation in about 40 days. This carries with it the erection of a complete hydro-electric power plant under direction of Manager Neil J. Sorensen, of Baker City.

Sydney, Nova Scotia.—The Dominion Iron & Steel Co. has just completed its new plant at Wabana, Belle Isle, Newfoundland, providing for increased haulage and shipping facilities for iron ore. Large areas of ore hitherto untouched will be opened up. The company is also preparing to erect additional open-hearth furnaces at Sydney, N. S., those now in operation being of inadequate capacity to provide steel to keep the blooming mill and rail and rod mills steadily at work.

Joplin, Missouri.—Smith & Fahlenbach, contemplate building a 150-ton mill. It is to be equipped with a 16-in. crusher, two sets of 30-in. and one set of 36-in. rolls, four large jigs, three sludge tables and two screens. The top of the hopper feed will be 57.3 ft. above the ground. The structure is expected to cost in the neighborhood of $14,000. It is not yet decided whether they will use electric or steam power.

Tusing & Son, of this place, are considering the building of a mill.

Hemphill and others, who recently leased the old Clifton mill on the Montgomery Lead & Zinc Co.'s property contemplate overhauling the mill and installing new jigs and a larger crusher.

Special Correspondence.

San Francisco. Aug. 9.

The hulls of four new dredges for the Yuba Consolidated Goldfields, along the Yuba river, between Smartsville and Marysville, have been completed and the machinery is being set in place for them. The company already has two dredges at work. Two others are being built for the Marysville Gold Dredging Co., so that in a couple of months 10 dredges will be at work in this comparatively new field. The tailings will be utilized by the Government for its retaining walls on each side of the river. James O'Brien, of Smartsville, has bonded in this vicinity another 400 acres of dredging land, at a price of about $125 per acre. In the tule lands of Sutter county tests have been made over a distance of 5 miles, where auriferous deposits have been found. There is no gravel, the gold being found in black sand at a depth of about 12 ft. No gold was supposed to exist in Sutter county prior to these discoveries. In Stanislaus county some 1,200 acres of dredging land have been proved up in the vicinity of La Grange. Prospecting for dredging ground is also being carried on near Honcut on the dividing line between Butte and Yuba counties, and between Snelling and Merced Falls in Merced county.

In this connection, it may be stated that a new departure is about to be made on 400 acres of mining ground on the famous Bloomfield channel, in Nevada county, where the ground will be worked by a combined dredging and drifting system. The surface being level, the top ground will be dredged as deep as possible, and the gravel below that will be drifted in the same manner as an ordinary drift mine. The ground is at Cherokee, between the Eureka lake property at Columbia hill and the North Bloomfield property at Badger hill. Surface workings in 1850 paid as high as $10 to $55 per day to the hand. Up to the time hydraulic mining was stopped, Jos. Hustler & Sons hydraulicked the top ground with profit. Richard I. Thomas and associates have the property under bond, and are arranging to work it in the manner described. There is plenty of water available.

A long-pending contest, involving numerous mines near Browns Valley, Yuba county, was finally settled when deeds to 560 acres passed from J. J. White, of Oakland, to Mrs. Emma Hibbert, F. W. Johnson, Byron Burris and Col. E. A. Forbes. The White family claimed the property as school land, and for 30 years has contested the rights of those who filed mining claims thereon. The case has been fought out in the land offices and in the courts, but no final settlement was ever reached, so the ledges have never been properly developed. Now, however, capital will be invested and mines will be opened up on a large scale. The new owners have given deeds to various locators, and several separate mines will soon be running.

Another mining suit, commenced in Shasta county in 1896, has been decided in favor of Charles Shiveley against the Eureka Tellurium Mining Co., with judgment for $14,682. The suit was originally brought by W. D. Tillotson, attorney for Shiveley, in the superior court of Shasta county. Shiveley, the plaintiff, was assignee of holders of promissory notes given by the Eureka Tellurium Co. in the aggregate sum of $21,000. The suit was brought in May, 1896. The court held that the notes were invalid because of a lack of necessary formalities in their execution. Shiveley then brought suit on *quantum meruit* for money advanced to and used by the company for its benefit. The Eureka Tellurium Co. did not dispute the claim, but the fight was made by Mrs. B. C. Northup, a stockholder, who appeared as intervenor.

The old cyanide mill at Willow Creek, latterly used as a pumping station for the Lassen Mining Co., at Hayden Hill, Lassen county, has been destroyed by fire, but the pumps were only slightly injured. The new mills of the company are near the mine, and the water is pumped to them 3 miles against a 1,600-ft. level. The old Golden Eagle mine of this company, re-opened a few years since, is now being worked on a profitable basis.

The old Alaska mine at Pike City, Sierra county, at one time a large producer, but for years idle, is about to be re-opened and a new shaft sunk. It has been decided to do this instead of working through the old shaft, in which so much trouble was met, by reason of the exceptional amount of water. The company will provide for such a contingency in the new shaft by erecting powerful pumps. After work was suspended in the mine some years ago the 60-stamp mill was destroyed by fire, and only a few years ago a 20-stamp mill was erected. Buildings are being erected for the new hoisting works, where steam will be used at first, and subsequently electric power. A building for the large boilers at the mine has also been erected; and also a new dwelling for the superintendent.

The Western Iron & Steel Co. has been organized in this city to utilize iron and manganese deposits near Port Harford, on the coast line of San Luis Obispo county, about 200 miles south of San Francisco. John A. Potter, of Pittsburg, is the general manager, H. C. Park, secretary, and C. A. Fish, engineer. There have been numerous sporadic attempts to open up iron deposits in this State, but they have seldom come to anything. The old Clipper Gap Co., Placer county, at one time made car wheels, etc., from the ore in that vicinity, but the burning of the works closed the property down years ago, since which time no iron deposits have been worked in this State. Lack of cheap, suitable fuel has been the main reason. Whether the cheap oil fuel can be utilized successfully remains to be proven.

In the United States District Court at St. Louis, Mo., a suit has been filed by Ralph Brucker, of Chicago, and Willard Snyder, of Salt Lake City, against the Great Western Gold Co., with offices in St. Louis and mine buildings at Ingot, in Shasta county. In the complaint it is alleged that the company has not filed a certificate of incorporation in Missouri and has not complied with the Missouri laws regarding foreign corporations. Hence all contracts made in Missouri are void. It is charged that of $12,000,000 capital stock, less than 10% has been paid in, and other irregularities are charged. The company, the plaintiffs say, has really valuable properties in California. An injunction is asked to prevent the company from disposing of the property or any assets and from keeping an office in or doing business in Missouri. The main office of this company was recently removed from St. Louis, to Ingot, Shasta county, and placed in charge of C. G. Balmer, head bookkeeper. S. E. Bretherton has been appointed general superintendent and smelter superintendent at the same place, where the Afterthought smelter was recently completed. The Great Western Co. above referred to owns the Afterthought and other properties on the copper belt of Shasta county, where large operations are being conducted by other companies. It has recently completed a smelter to work the Afterthought ores, and expects to begin shipping copper matte very shortly.

Butte. Aug. 8.

The Granite-Bimetallic Co., which has been operating near Philipsburg, Granite county, more than 20 years, and has taken over $30,000,000 from its mines, has quit business and pulled its pumps. The order to suspend was issued by Paul A. Fusz, president of the company, on Aug. 1. The suspension is due to an exhaustion of the bodies of rich ore. During the early history of the company the shareholders, principally St. Louis men, received $19,000,000 in dividends.

The Pittsburg & Montana Copper Co. has stopped making copper, and will not start its smelter again until it has a new blower. One has been bought from the Mountain Copper Co., and will be shipped to Butte as soon as possible. A month will elapse before it arrives. The company is extracting 90 tons of ore per day from its mines, and will have its bins full in 10 days. In casting for a place to sink a third shaft, bedrock was struck at 50 ft., and is perfectly dry. The company will sink there. Shaft No. 2 was put through 606 ft. of wash before bedrock was struck.

The Montana Zinc Co. is turning out 75 tons of concentrate per day and shipping it to the Lanyon Co., in Iola, Kan. The

lead product is going to East Helena. The company is being supplied with ore from the Lexington and other mines. The zinc concentrates run from 45 to 52% zinc.

The Electrolytic Zinc Refining Co., composed of Cleveland, O., men, is overhauling the Helena & Livingston stamp-mill near Corbin, Jefferson county, preparatory to the substitution of machinery for treating zinc ore from the Comet mine.

The Raven and Old Glory companies, which are opening their orebodies through the shaft of the Buffalo, an Amalgamated mine, are practically tied up, but will be running again in a few days. Last week both cages escaped from the engineer and went down the shaft, one being smashed to pieces in the sump, and the other lodging on a wall-plate 50 ft. below the 800 station. One cable was ruined.

After a shut-down of 10 days on account of an accident in the shaft below the 900 station, the Minnie Healey mine was opened again to-day, and will be running full in a day or two. During the suspension United Copper, which owns the mine, was short on ore.

Salt Lake City. Aug. 14.

The Carisa Mining Co., of Tintic district, has issued a statement to shareholders showing that on July 1 there was a deficit in the treasury of $3,914. The receipts from the sales of ore from September 30, 1903, to July 1, this year, amounted to $12,993; received as royalties from lessees, $32,645. During the period mentioned the company has done a great deal of development work in new territory and equipped the property with new machinery.

Manager Lafayette Hanchett, of the Newhouse mining interests, has made the statement that the Boston Consolidated Mining Co. may change its plans as to the building of its 2,500-ton concentrating mill. The company purchased and obtained options on a large acreage of ground along the west shore of Utah lake, in Utah county, and Managing Director Newhouse announced that would be the location of the mill and that a town, to be called Bostonia, would be built there. It is very probable the plant will go up near the site selected for the American Smelting & Refining Co.'s copper plant near the old Garfield beach resort in the Salt Lake valley. The smelitng company wants it there, and has made such overtures to Mr. Newhouse that a change in plans is almost a certainty. By coming to the Salt Lake valley the expense of constructing a railroad would be avoided and, besides, the transportation costs would be greatly lessened. The options on the Utah county property will be exercised, however, as some valuable water rights go with them.

The Rio Grande Western Co. will commence next week the construction of a 17-mile spur, from the Bingham line, to connect with the site of the proposed copper smelter of the American Smelting & Refining Co., and the site of the proposed concentrating mill of the Utah Copper Co. The former has let contracts for excavations which call for the removal of about 500,000 cu. yd. of earth. This practically concludes all the contracts, those for material and equipment having been made some time ago.

The capacity of the Yampa smelter at Bingham is to be brought up to 800 tons a day, by the addition of a second reverberatory furnace, an order for which has already been placed. Owing to the great amount of fines in the Yampa ores, the management has experienced much difficulty.

The ore and bullion settlements at Salt Lake for the month of July were reported at $1,549,100, a slight decrease, as compared to the previous month. The copper smelters, while actual figures are not obtainable, turned out over 6,000,000 lb. of copper bullion.

George H. Robinson, one of the principal owners of the Yampa mine at Bingham, Utah, has secured an option on the Mt. Andrews mine, on Prince of Wales Island, in southeastern Alaska.

The Sevier Consolidated Mining Co., R. W. Foster, Kimberly, Utah, manager, has let the contracts for the necessary equipment for the proposed new mill, which will have a capacity of 125 tons per day. Eighteen Merrall stamps, 1,200 lb. each, will be installed.

M. L. Requa, general manager of the Nevada Consolidated Copper Co., at Ely, Nev., while in Salt Lake a few days ago, announced that contracts for the construction of the Nevada Northern railroad, which is to be built from Toano, a station on the Southern Pacific, to Ely, a distance of 140 miles, would be awarded during the present month.

Through the experiments conducted during the present year by the Utah Consolidated Mining Co., at its smelter at Bingham Junction, for the purpose of finding a solution for the smoke problem, it developed that the gases, which have proved a deadly enemy to plant and animal life in the vicinity of the smelter, can be utilized for fuel purposes. In a plant now in operation at the smelter a saving of 25 tons of coal per day has been effected. Manager Channing is confident that the smoke trouble can be overcome, and that by the beginning of next year his company will be so equipped that the gases arising from the ores in smelting can be entirely under subjection.

Baker City. July 27.

The United Elkhorn mines, of Oregon, started sinking on May 3 from the 300 level station of the working shaft, and by July 10 a depth of 163 ft. was gained. The total cost, including breaking ground, hoisting, timbering, air charges and all charges chargeable to the shaft, was $40.25 per foot. The formation for 100 ft. was diorite and intrusive granite, when it changed to granite. The diorite formation has continued from the surface to the granite, a distance of 600 ft. The main ore-shoot, which is 700 ft. long, has held its values very evenly to the lowest workings, averaging about $15 per ton. A station will be cut, 20 by 47 ft., at a point 143 ft. below No. 3 station, and an electric pump will be placed there with a capacity of 500 gal. per minute; this electric pump is now doing duty on the 300 level. It will require a crosscut of about 15 ft. to tap the vein. The plan of hoisting waste from the shaft was illustrated in the issue of THE ENGINEERING AND MINING JOURNAL of June 29. The United Elkhorn has the distinction of being the only mine in Oregon operated entirely by electricity. The levels and shaft are lighted throughout by incandescent lamps.

Work was commenced August 1 on the Beaver crosscut tunnel, which, when completed, will be 5,000 ft. long, and tap the United Elkhorn ore-shoot 1,000 ft. below the present workings. The tunnel will also cut four other known veins in its course. It will be double tracked, and, when completed, will be used for transportation of ore to the mill, also for drainage. The ore cars will be hauled back and forth by means of a motor and trolley system.

Denver. Aug. 11.

A decision of the Circuit Court of Appeals, to which Duncan Chisholm, trustee of the defunct General Metals Co., had appealed, reverses the decision of Judge Riner, of the district court, that the claim of the Eagle Ore Sampling Co. was preferential, which sustains the claim of Referee George M. Irwin. This will place about $52,000 in the assets, which are to be divided among the creditors. The Sampling Co. claimed that the contract was only for treatment charges, while Mr. Chisholm claimed it was a contract of sale.

J. E. and George Carter, two brothers, were arrested in this city a few days ago, while reducing about $5,000 worth of Cripple Creek ore at their private plant. A consignment of ore, which the officers were notified would arrive by express, was watched, the express wagon in which it was transferred was followed, and the destination located, besides another lot of ore, which evidently came from the Portland and the Independence mines. The Carter brothers were arrested and locked up.

The Standard plant, of the United States Reduction & Refining Co., at Colorado City, is expected to close down within a few days.

A number of engineers are at present engaged in running a survey across the Sangre de Christo range from Mosca pass, southwest of Silver Cliff, and it is rumored that the Colorado & Arizona Rail-

way Co. will built from Durango to Pueblo, across the Wet Mountain valley.

It looks very much as if the American Smelting & Refining Co. will before long make more improvements in Pueblo, as options have been secured on considerable land in the vicinity of its plants.

On August 9 the directors of the El Paso Consolidated Gold Mining Co. declared the usual 2% dividend, amounting to $49,000.

At the meeting of the board of trustees of the State School of Mines, held yesterday, Arthur J. Hoskin, who has had about 15 years' experience in the different branches of the mining industry, was appointed assistant professor of mining. An addition is being built to the laboratory, and a number of new furnaces are being added, among these there being six which have been donated by Mr. Case, the president of the Denver Fire Clay Co. These furnaces are of an entirely new type, and are operated with gasoline.

Leadville. Aug. 12.

When the Yak tunnel was completed to the Jonny, there was some talk of driving it into Big Evans basin, but that was all that it amounted to. The water in this section has been the great drawback to its successful development, and the mines have been able to work at any depth only on account of the Resurrection doing the pumping. The burden became a little too heavy for that company, and the pumps in the lower levels were pulled. Now it is learned, on the best authority, that the Yak tunnel will be driven into the basin and so drain the whole section. The present length of the tunnel is 14,750 ft., and it will take over 5,000 ft. to reach the Big Evans basin. It is stated that the work will start at an early date.

Eastern and Colorado capital has taken hold of 160 acres on lower Rock hill, adjoining the Owers ground, and already work has been started. Five shafts are being sent down in different parts of the territory, but the company is undecided as to whether it will continue all of them to the blue lime. The ground is known as the Gold Dirt placer, owned by a local miner named P. J. McGeeney. At the head of the concern are P. J. McGeeney, of New York; Judge Dier and Dr. Paul Meyer, of Golden, Colorado.

The dead work recently done by the Ballard people is now completed and the work of taking out ore is in full swing. The most important work is being carried on at the bottom level, 420 ft., and in the neighborhood of 50 tons daily of oxidized sand is being sent to the smelter. On account of the smallness of the shaft the company is handicapped, as it is unable to hoist all of the ore that can be broken in a day. To obviate this, it is the intention of the company in the near future to enlarge the shaft, making it 4 by 9 ft. in the clear.

The owner of the Continental Chief, at the head of Iowa gulch, was in camp during the week, and has laid out plans for extensive work to be carried on during the fall and winter on this property. From the upper workings the mine produced a large tonnage of high-grade ore, and the new work contemplated will open this orebody at greater depth. Patrick Mulrooney has been placed in charge.

The McDonald brothers took a lease on the Rosebud claim, St. Kevin, in the early part of the summer, and after cleaning out old drifts and stopes got to work in one of the stopes, and at the latter part of the week opened up a 2 ft. vein of ore that runs high in silver. They have stripped the vein for about 50 ft. and are now in a position to ship.

A. Simons and E. S. Moorehead, Twin Lakes, have located several claims in that section and have opened veins carrying a good percentage of molybdenite, which will be shipped to the Colorado Tungsten works at Denver. The veins have been stripped on the surface for some distance.

Drs. Jeanotte and McLean, of Leadville, are interested in the Mosquito range section, operating a group of claims known as the Bonanza, located on Pennsylvania mountain near the Hock Hocking. A shaft has been sunk to a depth of 35 ft. on the Bonanza, and a few days ago a body of ore 7 ft. wide was opened, running well in silver, a little gold and about 45% lead. The work of sinking will be continued to determine the extent of the ore-shoot.

Good progress is being made in cutting the large station at the bottom of the Penrose shaft, and by the end of the month one of the large compound pumps will be installed, to be followed by two more. At present the triple-expansion pumps in the shaft are holding the water.

Sinking has started on the Bohn shaft, East Second street, and it will be sent down another lift of 350 ft., making it 900 ft. deep. When the bottom is reached prospecting for the Penrose ore-shoot to the south will be started. Another shaft in the down-town section that is going down is the Home Extension, East Fourth street, and when the requisite depth is gained, 750 ft., connections will be made with the Cloud City.

Bullfrog, Nev. Aug. 10.

The greatest activity in this district just now is to be found on the properties in which Charles M. Schwab has a controlling interest. The syndicate of which he is the head, and of which John McKane is the managing director, is pushing work on the Peerless and Great Eastern groups. Good ore has been uncovered on both properties. On the Crystal claim, at the foot of Montgomery Mountain and just east of the town of Rhyolite, the Schwab-McKane forces are crosscutting east and west from the shaft at the 100-ft. level. In the shaft they ran through a 4-ft. ledge of quartz at a depth of 50 ft., and they expect to crosscut this at about 40 ft. from the present bottom of the shaft.

The Tramp Mining Co., operating on Bonanza mountain, has put 20 extra men to work.

On the Gibraltar Mines Syndicate's property, which adjoins the Eclipse, the men are pushing their crosscut tunnel into the mountain and are sinking two shafts at the base of the hill on No. 6 and No. 7 ledges. The latter is Superintendent Nelson's latest discovery. It is believed to be a continuation of the Tramp ledge. The men are now down on this ledge about 45 ft., and the entire bottom of the shaft pans free coarse gold. At present the ledge matter is considerably granulated, but it is gradually assuming a more solid quartz formation.

The tunnel on the Gibraltar property shows every indication of approaching the No. 2 vein, as the full breast of the tunnel pans good values in free gold.

On Ladd mountain, to the east of the camp, the Bullfrog National Bank Co. is still sinking its shaft, which is now past the 160-ft. level, and in ore that will mill $20 or better. There is a 12-in. streak in the crosscut from the 100-ft. level that is rich.

The Shoshone National Bank Co.'s land, adjoins the last-named property on the north, and the men at work on it are driving a crosscut from the 50-ft. level with very satisfactory showings of rhyolitic quartz with manganese in the face of the drift.

Senator Macbeth, manager of D. H. Peery's Montgomery mountain property, has started a shaft on the Wall Street claim, and is going for the ledge which has been prospected from the Polaris property. This is a high-grade ledge. Besides this new shaft, Manager Macbeth is continuing the main tunnel into the mountain to reach the main Montgomery-Shoshone ledge.

Across the road from the Montgomery-Shoshone on the Providence group there has been encountered a body of high-grade ore, which is believed to be from a continuation of the Shoshone ledge. The strike was made in a 75-ft. shaft, 20 ft. from the Amethyst side-line.

The Elkhorn Co. has let a contract for 100 ft. of sinking in the main shaft. This property is just across the road from the Peery property.

The Bullfrog Steinway Co. continues to report good values in the bottom of the shaft, which will be carried down to the 100-ft. level before drifting is begun.

A number of men have been at work in the Indian Springs section, which is about two miles north from Montgomery mountain and on the strike of the Montgomery mountain ledges. The formation is traceable in this direction for several miles.

The question of mills is now being considered by some of the companies, as the water supply for that purpose is now settled beyond all doubt. Senator Oddie of the Eclipse Co. has secured a group of flowing springs about 7 miles from Rhyolite that insures an abundance of water for the Eclipse and several of its neighbors.

Gorrill & Mann have completed connections with the Indian Springs water source and their storage tanks at the head of Main street are now filled. The Patrick Co. has its trench about completed to the Beatty Ranch source, and pipe-laying will begin forthwith.

Platteville, Wis. Aug. 5.

Mr. Stone, of Chicago, and several associates are doing work on their holdings in the vicinity of Livingston, in Grant county. They are developing a property which promises to be as rich as the Coker mine, owned and controlled by the New Jersey Zinc Co., which has been a steady producer for the last four years. Mr. Stone's property is known as the Washburn mine and it is believed to be on the Coker range. This company has just recently installed power rock-drills and, after fully prospecting the property, it is the intention to install a complete equipment of modern machinery. One of the best features of the Platteville zinc and lead district is the fact, from the operators' point of view, that there are two fully equipped machine shops in the heart of the district which are prepared to furnish all necessary repairs and supplies.

The Empire Mining Co., located within the corporate limits of the city of Platteville, declared a 10% dividend on its capital stock on August 1. This means it paid out $5,000.

Another good dividend payer located in the city of Platteville is the Enterprise mine, belonging to the Platteville Lead & Zinc Co. This company is capitalized for $30,000 and is paying at the rate of 20% to 30% per month, besides creating a reserve fund. The Enterprise mine is located in the heart of the residence district and it is necessary to haul the ore to the concentrating plant, which is some distance from the mine. The concentrates are treated over a magnetic separating plant and bring top prices. Several carloads were sold recently at $47 per ton. This company has recently installed a complete compressor plant consisting of 100-h.p. boiler, 10-drill compressor and the necessary equipment of drills underground. The company is about to experiment with a gas-producer to be used in connection with the magnetic separating and roasting plant.

Scranton. Aug. 14.

Eight of the men recently appointed by the Luzerne county courts to act as members of the miners' examining boards have failed to qualify, and it will be necessary for the judges to make new selections before the district board can organize and begin business. Many of the miners have no desire to serve on the examining boards, owing to the scandals and reports that fraudulent certificates are issued.

Umpire Neill's decisions on the questions recently submitted to him by the Conciliation Board will be of great importance, as they all deal with reductions in the price of work. The operators' representatives contend that it is within the province of the operators to change prices for certain kinds of work whenever conditions change. The mine workers claim that the Strike Commission established a basis and a sliding scale, and that these must be observed and cannot be changed unless the provisions of the award are violated. During the argument before the board recently in New York, Mr. Neill asked each member of the board individually for his opinion in the matter.

Thomas F. O'Brien, foreman at the Heidelberg colliery of the Lehigh Valley Co. in Avoca, has been promoted to the position of general foreman at the Seneca colliery at Pittston. Mr. O'Brien is a practical miner, who fitted himself for his present position by private study.

Never in the history of anthracite coal mining have there been so many small companies organized for the purpose of exploiting any small tracts of coal land that have not been already pre-empted by the larger corporations. Probably no less than a dozen of these small companies have been organized in Scranton alone during the past twelve months. That there is a large amount of coal in isolated patches throughout the anthracite coalfields is undoubtedly true, but it is hardly likely that they will repay the capital to be invested in them for the purpose of bringing the coal to the market.

Superintendent Webber, of the Hazel Brook colliery, at Hazelton, makes the announcement that the new law relative to the non-employment in and around the mines of persons under 21 years of age, who cannot read and write, will be strictly enforced. Although a number of employees will be affected by the new order, Mr. Webber believes that the law is a beneficial one and should be strictly carried out.

The new Audenried breaker, a Lehigh & Wilkes-Barre Coal Co. structure, is rapidly nearing completion. Machinery is daily arriving and being installed as quickly as possible. Superintendent Hadesty hopes to have the breaker ready for operation by November.

A serious mine cave occurred at Plymouth on Wednesday. A comparatively large area was affected, the ground in some places dropping as much as 20 feet.

Toronto. Aug. 15.

A full account of the silver-mining industry at Cobalt, published in the Toronto *Globe,* as the result of a two weeks' close investigation on the spot, gives the following data: Cobalt is the center of at least 13 shipping mines, nine of which have been started within the last three months. Their production to date is as follows, including ore shipped and awaiting shipment, the values of the ore not yet realized on being based on a conservative estimate after allowing for smelter charges:

Mine.	Production to Date.	Veins Discovered.	Men Employed.
La Rose.....	$480,000	12	40
McKinley & Darragh.....	75,000	2	14
Nipissing.....	600,000	22	70
New Ontario....	400,000	9	24
Foster.....	60,000	12	23
Silver-Cobalt....	112,500	4	20
Lawson.....	60,000	3	10
Hargrave.....	.....	1	9
Canada Furnace	200,000	2	21
Buffalo.....	150,000	5	30
Hudson Bay.....	75,000	1	6
Violet.....	.....	2	10
O'Brien.....	25,000	6	20
Total.....	$2,237,500	81	297

Another important find of silver has been made in Bucke township, adjoining the township of Coleman, in which Cobalt is situated. The Richardsons, of Philadelphia, who hold an option on the property, where an outcropping of iron occurs, have been working it, and on July 29 found free silver at a depth of 4 ft. This indicates that the ore district extends further north than has hitherto been supposed.

Mining men are urging upon the Provincial Government the opening of the forest reserves and timber limits adjoining the Cobalt mineral region to prospectors. Although no claims are allotted or discoveries in the territory embraced within timber limits or set apart as forest reserves, it is found impossible to keep out the rush of prospectors. Gillies Bros., of Renfrew, Ont., own extensive timber limits adjoining the Cobalt mineral district, on which a large amount of timber is standing. It is in the power of the Government to refuse renewal of the timber licenses, but the difficulty is, that while they derive a large revenue from timber, they receive but little from mining, as there is no royalty on the output. The question of opening all new mineral lands on a royalty basis is being discussed.

The executive committee of the Lake Superior Consolidated Co., which met recently at Sault Ste. Marie, has in view the erection of a coke plant, as it is necessary now to bring in all the coke used at the works, amounting to 150,000 tons annually. The management is investigating the question of procuring Canadian ore of bessemer quality from the Josephine mine and other properties within easy distance of the works. The present output is about 500 tons of steel rails per day, and from 475 to 500 tons of pig iron, or nearly enough to supply the rail mill, the remain-

der coming from Midland. The Helen mine is yielding 1,000 tons of ore per day. The company has orders ahead for 75,000 tons of steel rails.

The mining interests of Mackenzie & Mann and Marks & Wiley in properties on the Atikokan iron range, the extent of which is between 20,000 and 25,000 acres, have been merged. The properties will be transferred to a new company which is being organized for their development under the title of the Port Arthur Iron Mines Co., Ltd., which will be capitalized at $500,000. They are arranging to ship ore to the United States.

Stephen Wellington is opening up a fluorspar deposit near Madoc, in Hastings county, and has made some shipments of this mineral.

Prof. Willett G. Miller, provincial geologist, has returned to Toronto from a trip of inspection in eastern Ontario, in the course of which he visited the feldspar mine, near Bedford Station, 30 miles south of Kingston, owned by Richardson Bros., Kingston, where operations are being actively carried on. Contracts for 10,000 tons of this high-grade spar are being filled this season, most of the output going to the United States. There is little doubt that this is the largest known deposit of its kind.

The Bruce copper mines, on the north shore of Georgian Bay (Bruce mines post office), have been purchased by the Lancaster syndicate, of London, England. The purchase is the result of an inspection conducted for several months by H. J. Carnegie Williams, an English mining engineer, who, with T. Hayes Sheen, of London, will be on the board of directors of the new company. It will be known as the Copper Mine & Smelting Co., Ltd., and capitalized at $1,000,000. The mines were discovered in 1846, and worked for 30 years by John Taylor & Co., of London, paying for some years dividends of 25%. Owing to a depreciation in the price of copper, the mines were abandoned for some time. In 1898 the present Marquis of Queensbury and his brother became the owners and made an attempt to work the mines, but lost money. The property was afterwards disposed of to the Bruce Mines Copper Co., which has just sold out to the new company. It is hoped that the great improvement in transportation facilities and the discovery of economical separation processes, since the mines were formerly operated, will enable them to be profitably worked. The property comprises 12,840 acres. The plans include the building of a smelter.

Application for incorporation has been made by the New Ontario Ores Reduction Co., Ltd., with a capital of $500,000, in which a number of prominent American and Canadian capitalists are interested. The promoters include A. D. B. Van Zant, of Detroit, for some time connected with the Detroit & Panama Mining Co.; and Alfred C. Gardé, recently interested in British Columbia. The location of the plant has not yet been decided on.

Sudbury. Aug. 10.

The first sod of the Ontario Northern & Temagami railway was turned by O. Aubin, M. P. P., assisted by John Craig, representing the railway company, and Mayor McKee, of Sturgeon Falls. Sturgeon Falls will be the present headquarters of the company, with John Craig as president. The charter is for the construction of a railway northerly from Sturgeon Falls to the southwest arm of Lake Temagami and southerly from Sturgeon Falls to the mouth of the French river or Byng inlet.

The Canadian Copper Co. is erecting a new smelter at Copper Cliff which will be ready for business by October. This new plant will practically be a customs smelter for the treatment of higher grade ores. The cost of construction will be in the neighborhood of $75,000. Electrical power from Turbine, 25 miles west of Copper Cliff, will be utilized; 10,000 h. p. has been developed and the work is now nearly completed.

The influx of mining men still continue into the Cobalt country; parties from Philadelphia, Spokane, New York, New Jersey, Quebec and British Columbia are recorded. Many members of the Ontario Cabinet are visiting Cobalt this week; among the number is Hon. Frank Cochrane, Minister of Lands and Mines, who spent several days in Sudbury.

John A. Montague, assayer of Sault Ste. Marie, reports a find of cobalt ore on a location near Massey station. Another find is recorded by Mr. Johnston on his farm in the township of Pennefather, near Sault Ste. Marie.

Cobalt has been discovered in township 137, in the district of Algoma, on the Whisky Lake copper mining location. The find is 70 ft. from the copper vein.

The Ontario Powder Co. has purchased the Dreany Cyberite Co.'s factory near Sudbury. Mr. Garrett, late manager of the latter company, has resigned and gone to Montreal.

At Atikokan considerable activity prevails in the iron district and many prospectors are actively engaged. A plant is being installed for the extraction of ore for the Port Arthur blast furnace. There is also considerable diamond drilling going on in this field.

The copper claims in Gladstone township (district of Algoma), in the vicinity of Blind river, will be developed at once. The claims covers 400 acres and are only 7 miles north of the Canadian Pacific railway.

Superintendent Lewis, of the Algoma Steel Co., and designer of the steel rail mill at Sault Ste. Marie, has made application to the executive committee for an appropriation that will enable him to erect a plant for the manufacture of light rails.

A report is in circulation here that Cobalt Lake has been thrown open for location after having been reserved for some time, and that in less than 24 hours from the time that the notice was placarded in the office of the Mining Agency in the division, the entire location was staked; some prospectors declare their emphatic disapproval of such secret methods of throwing locations in the field, more particularly in a place of this description which is supposed to be extremely rich.

Another coal find is reported from the Whitney country, on the survey of the new Grand Trunk Pacific, and several Sudbury gentlemen are on the ground floor. There is good reason to believe that there is truth in the latter statement; the result will mean much to this district.

Application is made by the Hutton Mining Co., Ltd., to surrender its charter, dating from August 7.

Two mining locations in the township of Scadden, known as the Eagle Nest mining locations, will be sold under a mortgage; the sale will be in Toronto. The properties are undeveloped and were taken up for the purposes of working them as gold locations.

London. Aug. 5.

The Etruscan Copper Estates have at last apparently overcome their contempt for the advice of skilled mining engineers. For years operations have been conducted on costly lines, in direct opposition to the advice and opinions of competent mining men, such as R. J. Frecheville, E. P. Rathbone, Alexander Hill, J. H. Fawcett, C. A. Moreing and others; and the directors have even gone so far as to commence libel actions against some of these gentlemen for the criticisms contained in their reports. They announced, three years ago, that they were done with expert advice, and that the results obtained at the mine and smelter would prove who was right. As it turns out, events have proved who was right, though in a way not foreshadowed by the directors. They have now decided to swallow their pride, and go back to one of the gentlemen, Mr. Alexander Hill, for whose advice they formerly expressed supreme contempt. He is to make a thorough examination of the mine and give advice again. Let us hope that the directors will accept it in its entirety, and act upon it. It is interesting now to turn to his report published three years ago.

Your readers have been kept posted by your Australian correspondents with regard to the doings at the Associated Gold Mines of West Australia, and will therefore remember that Mr. Landau, the chairmon of the board, chose to make a scapegoat of Mr. Gleisberg, the manager, so as to cover up the tactics of the board of forcing the production for the benefit of the stock exchange transactions. This matter has been forcibly brought before

the shareholders in London, this week, by Mr. J. H. Cordner-James, one of the well-known family of James, mining engineers and metallurgists, who had been requested by a large body of shareholders to enter as a candidate for a seat on the board, in opposition to Mr. Landau. It is not necessary here to go into the whole details of the fight between the two sections of shareholders, led by Mr. Landau and Mr. Cordner-James respectively. The accusation against Mr. Landau is that in his capacity as stockholder he uses his control of the board for stock-exchange purposes, and directs the mining operations and exercises his judgment as to what reports shall be published and what suppressed, entirely from the view of his stock-exchange requirements. His suppression of Mr. Gleisberg was simply an expedient for laying the blame of mismanagement on anybody's shoulders but his own. In Mr. Gleisberg's place, Mr. George M. Roberts has taken up the management in addition to that of the Associated Northern Blocks, another of Mr. Landau's companies. Mr. Roberts has already reported that the mine has been forced too much, thus condemning Mr. Landau's methods. The meeting of shareholders lasted for a long time, and a large majority of those present were with Mr. Cordner-James. On appealing to the proxies, Mr. Landau came out on top, so that he still controls the company, and the efforts made by certain shareholders to get a good mining man on the board have failed.

This incident once more raises the question of the use of proxies. On the issue of a yearly report or of a notice of a meeting for some other business, the directors state what they are going to propose, and they ask for proxies from people who do not expect to be present at the meeting. It matters not what transpires at the meeting, or what is the nature of the opposition to the directors' schemes, the proxies are still used by the directors, so that a verdict has been given before both sides are heard. In this way the directors' proposals are often forced through, in spite of an overwhelming opposition among the people who have had the opportunity of hearing both sides.

Johannesberg. July 1.

A serious row broke out amongst the Chinese coolies on the New Crœsus mine recently. For the first time, the coolies attacked white men, killing one of the miners employed. A determined raid was made on the quarters of the white miners, the Chinese being armed with drills, etc., and the rooms were wrecked by the coolies. The white men saw it was useless to resist, so they retreated from their rooms. One poor fellow, however, was surrounded by the coolies and beaten to death. None of the white men seemed to have firearms. Had they fired into the mob and killed a few of the coolies, it would have been the best thing that could have happened. It speaks volumes for the majesty of the law in this place that no lynching of coolies has followed this most regrettable incident.

The incident seems to have terrified the miners on the New Crœsus, and for days they refused to go below with the coolies. They have sent a deputation to Lord Selborne to ask for protection. To show such fear of the coolies is both unfortunate and absurd. Nothing emboldens a Chinaman more than the show of fear in an adversary, and nothing so upsets him as a bold front.

Another row, much less serious, no one so far being hurt, has broken out on the Rose Deep mine. The coolies seemed to be displeased at their cooks and police and struck work. There is no use beating around the bush and saying that these outbreaks are of no consequence. They are most unfortunate. Nor is it wise to put on a long face, declare the Chinese a failure and a menace to the peace of South Africa. The most regrettable side of the outbreaks is the fact that the anti-Chinese will use them to the uttermost, magnifying a small row into an organized rebellion. Unfortunately, politics plays a large part in the Chinese question here, and the matter must be handled "with silk gloves," for fear of giving offense.

An investigation of the riot at the New Crœsus shows that the Chinese coolies were not entirely to blame. For some time there had been ill-feeling between the miners and the Chinese controller on the mine. The day of the row was a Chinese holiday. After much persuasion they went to work on the night shift, but none of the white men who had been warned to turn out went to work. On returning to their quarters, words passed between the coolies and the white men. The daughter of the boarding-house keeper was married the day after the row, and many of the miners celebrated by getting drunk. They told Stewart, the compound manager, that they intended "blotting him out." Stewart seems to have known that a row was in the air, and stationed some Chinese police near the quarters. When he left the dancing hall, the miners surrounded him and a wordy interview followed. Thinking that Stewart would be attacked, the Chinese police blew their whistles. In a few minutes all the coolies were on the scene, armed with sticks, etc. They demolished most of the white miners' rooms, and a white man was beaten to death.

Stewart is in jail, charged with murder. The charge cannot possibly be proved, but as it is an unbailable offence, he is kept in jail, to the indigation of most people, who declare he is not to blame for the riot. It is satisfactory to note that things are running smoothly on the New Crœsus and also at the Rose Deep, where there was another slight disturbance.

There are now over 40,000 Chinese coolies at work on the Witwatersrand. A boat arrives at Durban this week from China with 2,000 more. The number that will be recruited in the future depends upon how the Kafirs come to work. There might be a decrease in Kafirs during the coming months, and in consequence more Chinese will be brought to Africa. A better class of coolie is coming now. The first lots contained many incompetents. No more laborers from southern China are to be brought, as the miners seem inferior in every way to the northerners. There will be no trouble in recruiting as many laborers as are required for the Rand from northern China.

The latest addition to the industrial enterprises of the Transvaal is being brought out by the Coronation Syndicate, the South African Kerosene Oil Shales Syndicate. A glowing report has been made, and, of course, we are assured that the success of the venture is certain. The Coronation Syndicate has not been successful in its gold-mining enterprises.

One of the brightest features of the Rand mining development is the Robinson Central Deep mine, of 45.6 claims in the central part of the Rand. This mine seems to have the rich patches of ore that were met in the neighboring mine, the Bonanza, which is now nearly worked out. The mill is under the same roof as the mill of the Crown Deep, and is of 100 stamps. The whole mill is 300 heavy stamps, and more gold is probably turned out from this plant than from any other reduction plant in the world. The showing of the Robinson Central Deep since the first of the year is as follows:

	Tons milled.	Yield.	Profit per ton.
January	10,105	$124,272	$7.28
February	9,822	124,454	7.68
March	10,019	131,594	7.62
April	9,570	127,512	7.98
May	12,650	155,102	7.26

This mine has not been at work a year, but already it has paid a substantial dividend.

Everyone is jubilant over the results of May. At last the best pre-war month, that of August, 1899, has been excelled. It has taken nearly four years' hard struggle, and the expenditure of vast sums of money in the introduction of Chinese, to reach the point where we left off in 1899. Now that we have climbed so far up, it is probable that we will hold the position for a number of months, and a monthly output of 400,000 oz. for the Rand seems assured for this year and the next. It must be remembered, however, that nearly all the effective stamps on the Rand are now at work. The oncoming deep-level mines will balance the outgoing outcrop mines, so that the gold output of the Rand cannot go on indefinitely. It is probable that 450,000 oz. per month will be the high-water mark of gold production on the Rand. Such a brilliant prospect is given to few countries in the world, and makes people hopeful of the future, in spite of Chinese rows and other petty troubles.

General Mining News.

Exports of mineral oils from the United States for July and seven months ending July 31 were as follows, in gallons:

	July.	Seven Months.
Crude	8,759,884	57,310,079
Naphthas	1,439,078	15,709,575
Illuminating	76,418,036	491,126,850
Lubricating	7,465,917	55,684,345
Residuum	10,661,188	38,284,800
Total	104,744,103	658,115,649

Paraffin is included in lubricating oils. As compared with last year there was an increase of 7,855,851 gal. in July; and an increase of 98,796,278 gal. for the seven months.

Sunday Creek Coal Co.—The board of directors has elected the following officers: H. Heiner, vice-president and manager of sales; J. M. Roan, manager of mines; G. E. Tetrick, manager of stores; J. H. Schwartz, assistant to the president; N. D. Monsarratt, chief engineer; C. F. Mayer, corresponding secretary; Wm. S. Bainton, secretary; C. A. Suydam, treasurer; S. W. Gilliland, auditor. The central office will be in the Outlook building, Columbus, O.

A circular from President John H. Winder, dated August 1, says: "The properties of the Sunday Creek Coal Co., the Buckeye Coal & Railway Co., the Ohio Land & Railway Co., the Continental Coal Co., the Kanawha & Hocking Coal & Coke Co., have been taken over by the Sunday Creek Co., as of this date. All accounts due any of the above named companies are payable to the Sunday Creek Co., and accounts due by any of the above named companies are assumed by the Sunday Creek Company."

Texas Oil Rates.—A Washington dispatch of August 11 says: "In the complaint brought before the Interstate Commerce Commission by James Guffey, president of the Gulf Refining Co., against the Illinois Central, the Louisville & Nashville Co. and others, citing these roads to show cause why they should not be proceeded against for violating the Interstate Commerce act by discriminating rates in favor of the Standard Oil Co., the railroads capitulated today without a show of fight. The attorneys for the Louisville & Nashville and the Illinois Central filed briefs reciting a new tariff, correcting the discriminations complained of by President Guffey.

"It was shown in the argument before the Interstate Commerce Commission by the attorneys of the Gulf Refining Co. that the rate northward on Texas oil from New Orleans to Chicago was 41c. per 100 lb., and the rate southward but 23c. The rate from New Orleans to Cincinnati was 39c. and southward 22c. From New Orleans to St. Louis and Louisville northward was 35c. and southward 18c. The answer of the railroad companies today puts the northward tariff at precisely the same rates as for Standard Oil going south.

"The charges of combination between the railroads and the Standard Oil Co. and of discrimination were made in a complaint filed in June by the Gulf Refining Co., of Port Arthur, Texas. The complaint alleged that the difference in the rates between north-bound and south-bound petroleum operated as a bar to Texas and Louisiana oil entering the territory of the Standard Oil Co., but permitted the Standard Oil Co.'s products to enter territory in the South.

"The Cincinnati, New Orleans & Texas Pacific, the Alabama Great Southern, and the New Orleans & Northeastern are involved in the case. It is believed that they will follow suit of the other roads."

ALABAMA.

JEFFERSON COUNTY.

The development in the northeastern portion of this county, in the vicinity of Leeds and Henry Ellen, is being pushed. The Tunnell Coal Co. is opening new mines on an extensive scale, but it will be four months before the 11 miles of railroad track will be completed to reach the property. The Tennessee Coal, Iron & Railroad Co. has opened new mines near Henry Ellen and started mining coal. These mines are well equipped with electric machinery and other modern appurtenances.

ARIZONA.

GRAHAM COUNTY.

Arizona Copper Co., Ltd.—This company reports that the output from the mines at Clifton for the month of July was 1,261 short tons of copper.

Colonial Mining Co.—A company with this title has been organized to work the quicksilver ores found in veins 14 miles east of Ehrenberg, on the Colorado river. The vein system is said to be traceable for several miles, and to have a width at the surface of 4 ft., and of 6 ft. at the bottom of a 200-ft. shaft. About 1,000 ft. of work has been done, chiefly drifting and cross-cutting. There are five full claims. Fifteen men are employed. The ore, as received at the Arizona School of Mines, consists of cinnabar, distributed through an earthy and silicious gangue.

CALIFORNIA.

AMADOR COUNTY.

Climax.—P. J. Aiken, of this mine, has bought the 10-stamp mill of the Reward mine, Pine Grove, and is hauling it to the Climax. The grading is being done for an additional 10 stamps when necessary.

Keystone Mining Co.—At this mine, Amador City, R. C. Downs, formerly of the Bunker Hill, has taken the superintendency in place of Edward Lynch, resigned.

Zeila Mining Co.—The new hoisting works are about to be put in operation at this mine, Jackson. The mill will be closed down while the change is being made.

BUTTE COUNTY.

Gold Bank Mining Co.—The main tunnel of this old mine at Forbestown has been cleaned out 2,200 ft., its entire length. The mine was at one time a large producer, but for some years the ore found was poor, and 10 years ago it was practically closed down. The cleaning out of the adit would indicate a resumption of operations. The principal owner, Harry P. Stow, is now with the Alaska Treadwell Mining Co., in Alaska.

CALAVERAS COUNTY.

San Andreas.—A whim will be put up at this quartz mine at once. The shaft is being enlarged to a double compartment, and suitable machinery will shortly be installed.

Union Copper Co.—The first of the three new furnaces of this company at Copperopolis, G. McRoss, manager, has been completed, and work on the second one commenced. Each is of 100 tons daily capacity.

EL DORADO COUNTY.

Crane's Gulch.—The old shaft at this mine, near Georgetown, has been pumped out, and development work is progressing.

Cedar Creek.—At this mine, Fairplay, F. M. Phelps, the superintendent, has commenced work on a 1,000-ft. level to tap the center of the channel.

MADERA COUNTY.

Minarets.—It is understood that capitalists have secured 27 claims of the famous Minarets mines and will soon develop them.

NEVADA COUNTY.

Murchie Mining Co.—The water has been turned into the ditch from the enlarged reservoir of the company's new mill, and the mine now has a fine water system.

Union Consolidated Mining Co.—The hoisting works at the Summit mine are being hauled to this property at Nevada City. The water has been lowered in the Union to the 200-ft. level.

Bullion.—At this mine, Grass Valley, the water has been lowered to the 1,200-ft. level, and there are but 300 ft. more to pump out.

PLACER COUNTY.

Placer Gravel Gold Mining Co.—This company, at Last Chance, D. M. Ray, superintendent, has put in a 50-h.p. gasolene engine for motive power and for forcing air into the mine.

SAN DIEGO COUNTY.

Julian Consolidated Mining Co.—This company, at Julian, is pulling up a 50-ton roaster, a 50-ton cyanide plant and a 20-stamp mill. New shafts are being sunk on both the Helvetia and High Peak mines. W. W. Boswell is general superintendent of the company.

SHASTA COUNTY.

Redding Gold & Copper Co.—This company, J. Creighton, superintendent, has 12 men constructing the 850-ft. flume intended to divert the water of Clear creek. Power will be generated at the dam, and where the bed of the creek will be laid bare placer mining operations will be carried on.

Eureka Tellurium.—W. D. Bradford, who has a lease on the Eureka-Tellurium mine, near Middle creek, has discovered the extension of the ledge across the Sacramento river and is now sinking on the vein.

Mountain Copper Co.—Repairs are being made at the smelters of this company at Keswick, and more men are employed in the machine shops than for two years past.

SIERRA COUNTY.

Gibraltar.—Kieffer Bros. have resumed operations on this mine on Cañon creek, Poker Flat district, and are now unwatering the shaft.

SISKIYOU COUNTY.

Phares.—The Portland, Oregon, company, which has this mine at Cecilville under bond, is preparing for new ditches and flumes to be used for increasing the water supply for hydraulicking.

TRINITY COUNTY.

Gold Ridge.—This mine at Coffee has been bonded to San Francisco men for $35,000. The mine has been shipping some telluride ore to the smelters.

Bullychoop.—W. R. Beall, R. O. Evans and W. S. Smith have an option on these mines and intend to form a company to work them. A small force of men is blasting out ore, ready for starting the mill in a few weeks.

COLORADO.

BOULDER COUNTY.

Mitchell.—It is reported that the National Fuel Co. has purchased this mine, the price being over $100,000. The company also owns mines at Walsenburg and Trinidad, and the Mitchell mine will be developed immediately to a capacity of 1,000 tons per day. Harry Van Mater, Denver, is manager of the National Fuel Company.

Gunnison.—At a depth of 150 ft. in this mine, in the Sugar Loaf district, operated under lease by Walter Crippen, an 18-in. vein of talc has been uncovered which carries high silver and gold values. A shipment will soon be made to the Denver smelters.

CLEAR CREEK COUNTY.

Denver-Salt Lake Railway Tunnel Co.—At a meeting of the stockholders in Denver this week, this corporation, now in control of the "Brick" Pomeroy tunnel, completed arrangements for the completion of the tunnel, which was started in 1880. The tunnel will be 3½ miles long and will cut through Gray's peak in the heart of the Rocky Mountain range. The contract for driving the tunnel from both the Clear Creek and Summit county sides is to let to the Denver & Salt Lake Construction Co., of New York. The tunnel is to be 10 by 12 ft. The old workings are in 5,300 ft. on the east, or Clear Creek end, and machinery is to be installed at both ends of the tunnel, work to commence about September 1 next.

GILPIN COUNTY.

Gilpin & Clear Creek District Railway.—Amended articles of incorporation have been filed, showing increase of capital stock from $50,000 to $1,250,000. The proposed railroad will run between Central City and Pactolus, will be 17 miles long, of broad gauge, and will connect with the Moffat road. Local parties are largely interested and it is expected that the contract for grading the road will soon be let.

Pleasant Valley Mining & Milling Co.—This is the reorganization of the former Banta-Hill Consolidated Mines Co., operating the Banta-Hill group of mines in the Pleasant Valley district. Detroit, Mich., parties are largely interested, and the intention is to start up within 30 days on an extensive scale. The new company will also arrange for the extension of the Gilpin Tramway lines to the Hill, or main shaft, for the handling of coal and supplies as well as future shipment of ores, and also intends to build a mill for the treatment of the lower grade of ores. R. L. Martin, Central City, Colo., is manager.

Imperial.—Manager L. J Mountz, Apex, Col., has ordered a 7-drill air compressor of the "Wonder" pattern, made by the Hardsocg Drill Co., of Ottumwa, Iowa, which is to be installed at the Mackey mine. The mill is also being overhauled, new mortars put in and a new Moulton crusher, which will increase the capacity. The orebodies are being opened up in the 200-ft. workings.

Boston-Occidental Mining Co.—Contract work on the new ore-drying room at American City has been commenced and it will have a capacity of 100 tons per day. Boston capitalists who are interested in this company will investigate the proposition to run a tunnel under James Peak, as well as the advisability of erecting a reduction plant patterned on that at American City. S. S. Ripley, American City, via Apex, Col., is president and manager of the company.

TELLER COUNTY—CRIPPLE CREEK.

Bull Hill Mining & Development Co.—Considerable work is being done on the Cresson property, which is being operated by this company. The shaft has been thoroughly re-timbered and put in shape, and some ore is being shipped. The property is located in Arequa gulch, and consists of several claims. A large amount of work has been done on the property, both in sinking and drifting. Mr. Richard Roeloffs, of Cripple Creek, has lately been appointed manager of the property.

Isabella Mines Co.—Sinking is in progress on the Empire State shaft of this property. The shaft was 800 ft. deep when the present sinking commenced, and it is to be sunk to the depth of 1,300 ft. A new hoist has been put in, and work is progressing favorably. Other parts of the Empire State property are under lease to C. N. Crowder and associates. Murphy and associates on the main Isabella workings are making some money.

Forest Queen.—Work is being pushed steadily on this property on the north slope of Ironclad hill. The property is being worked by J. K. Walsh and associates in Chicago. Development work is in progress in several levels. No ore is being shipped at present.

Gold Coin.—This property is being principally operated by lessees, who are working on the various levels. Ore is also being extracted from the Granite mine through this shaft. The management of the property also use the mine to show tourists through. The tourists are lowered through the Gold Coin shaft and taken through the Columbine tunnel by trolley, a distance of nearly a mile, to the Economic mill. A charge of $1 for each person is made.

INDIANA.

More Coal Mergers.—Job Freeman, a Linton coal operator; M. Gould, of Indianapolis; Senator Cyrus Davis, of Bloomfield, and others held a conference in Terre Haute, August 10, in confirmation of another merger company which is to have $1,000,000 capital stock, and is to take over properties in Greene county. L. T. Dickason, a director of the Monon railroad, is interested.

A company promoted by the Southern Railway Co. is taking options on coal lands in Gibson county. Options have been obtained on the Patoka Valley Co., the Winslow Coal Co. and the Ingle mines along the road in the Southern Indiana coalfields. It is said the company also has options on 12 mines just over the line in Illinois. The capital stock of the merger company will be $2,000,000. The Princeton mines are not in the merger.

The Enterprise mine, near Bicknell, was sold to the Vandalia Coal Co., on August 9. This mine and about 1,500 acres of coal land brought $75,000. A few other neighboring mines are said to be under option to the same company.

LOUISIANA.

CALCASIEU PARISH.

Jennings.—Bass & Benchenstein have started the drill on well No. 4; No. 1, which has produced about 2,000,000 bbl., has resumed flowing.

Judgment has been given in the case of Martel and others against the Jennings-Heywood Oil Syndicate in favor of the

plaintiffs. The ownership of the Arndaudet tract and of 2,000,000 bbl. of crude is in question. Further litigation may be averted by a settlement.

MICHIGAN.

HOUGHTON COUNTY—COPPER.

Challenge.—The vertical shaft sinking in this property, which is owned by the St. Mary's Mineral Land Co., has cut a seam of copper. It is believed to be a small branch of the Baltic lode.

Quincy.—The outlook at this property is very promising. The older shafts are keeping up their production while the new shaft on the Mesnard, No. 8, will be in shape to furnish a large increase in a few months. No. 8 is north of the other shafts, being separated from the main Quincy tract by the old Franklin. Drifts will be extended southward under the Franklin, and will connect with the older shafts at increased depth. Contracts have been let for heavy machinery, and after the plant has been installed the production will be largely increased. The quality of the Pewabic lode at this point is excellent.

KEWEENAW COUNTY.—COPPER.

Allouez.—Underground opening work is being pushed aggressively, and No. 1 shaft is now sinking to the fifth level. At that depth there will be available a stretch of 500 ft. of ground for stoping purposes. It is expected that rock shipments to the Centennial mill at Grosse Pointe will be commenced in September.

ONTONAGON COUNTY—COPPER.

Mass Consolidated.—Within a few months this mine will increase its production considerably. Next fall the new C shaft will be equipped to handle its rock output and the Mineral Range spur will be completed to the shaft then. Openings in the A and B shafts are good. Nothing of exceptional importance has resulted from the explorations on the Minnesota group of lodes.

At the hydraulic compressor work is under way on three intake shafts, which are down 75 ft. Three shifts will be put on this work and it is expected that the sinking will be advanced at the rate of 8 ft. per day. There is still 275 ft. to be sunk. The air-chamber, 18 ft. wide, 26 ft. high and 308 ft. long, is entirely excavated in solid rock and ready for the air pipes, which are on hand. The foundation for the stamp-mill is laid in concrete on solid rock, and the heaviest machinery for the stamp-head is in place. The frame of the mill is erected and partly enclosed, and all the machinery is on hand, except the concentrating equipment. The foundations for the rock and shaft-house and also for the hoisting engine have been laid in concrete on rock bottom, and are ready for the superstructure. The gravity railroad is practically all graded and ready for the rails, which are on hand, but there is still some trestle and bridge work to be done.

MONTANA.

DEER LODGE COUNTY.

Anaconda Reduction Works.—The mills and smelters of the Anaconda Copper Co. receive 8,000 tons of ore per day. The coarse concentrate, high-grade ore, converter slag and briquette go to the 7 blast-furnaces. The finer concentrate is taken to the McDougal roasters, which leave therein 7½ to 8% sulphur; the roasted material then passes to the reverberatory furnaces, which also receive the copper-flue dust. The matte from the reverberatory and blast-furnaces is then treated in the converters. The blast-furnace charges are made up in tilting cars and thrown into the furnaces by compressed-air equipment. The slag is granulated and conveyed to the dump through flumes. The slime from the mill is briquetted and the briquettes are mixed in the blast-furnace charge. An interesting feature here is the arsenic plant. The arsenical flue dust undergoes two sublimation processes and the white arsenic crystals are gathered in zig-zag brick chambers. This manufacture is said to be a source of profit, the demand for the product being good.

SILVER BOW COUNTY.

Colusa-Parrot.—This company's smelting and concentrating plant at Butte, known as the Butte Reduction Works, is owned by W. A. Clark, and is managed by A. H. Wethey. The concentrator handles 1,000 tons of sulphide ore per day, making 250 tons of concentrate. The ore-dressing equipment consists of crushers, rolls, chilean mills, jigs and tables. The tailing from the finishing jigs passes to Pratt sizers. These machines size the material before it passes to the tables. The pulp goes from the fine jigs to a distributor having six discharges, through which it is carried by centrifugal force to a stationary screen. The undersize here passes to the tables and the oversize is reground by chilean mills. This is the device of Fred. Pratt, mill superintendent. The concentrate, which carries from 15 to 20% silica, passes to Wethey calcining furnaces, thence to the reverberatories. The crude ore fines are mixed with the concentrate in this process. From 5 to 7% sulphur remains after calcining. The higher-grade ore, that which requires no concentration, is subjected to kiln-roasting to desulphurize it, after which it goes to the blast-furnaces. A new stack, to be 350 ft. high and 18 ft. in diameter, is under construction, the material being reinforced concrete. A new system of dust flues, connecting the reverberatory and blast-furnaces with the stack, is also being constructed. The system will be 450 ft. long and 65 ft. in width. Three stands of converters are also being installed. David Matthews is superintendent of the smelters.

Montana Zinc Co.—Mention has been made of the installation of crushing, concentrating and separating machinery at the old Alice plant by this company. The plant will run on zinc ores from the Alice and Emma mines at Butte. The zinc ores, which are rich enough to work, carry a small per cent of lead, 20 to 25% zinc, 5 to 10% iron, 5 to 10 oz. silver, $1 gold and 0.5 to 1% copper. Considerable bodies of zinc ore of this grade are said to exist in the old workings of the Alice mine. The Emma is in the down-town district, on the Black Chief lode. It is controlled by the Butte Copper & Zinc Co., closely allied to the Montana Zinc Co. C. B. Wisner is manager of the two companies. Blake separators have been installed at the mill.

Speculator.—This mine belongs to the North Butte Mining Co., of which E. C. Carson is manager. Its location is between the Bell and High Ore. Shipments run about 800 tons daily to the Washoe smelter at Anaconda. That designated as first grade, amounting to 500 tons per day, runs about 6% copper. This ore carries about 1 oz. silver to each per cent of copper; the iron in it runs from 5 to 20%. It is all a sulphide ore in a quartz and granite gangue. The workings in ore have reached 1,800 ft. depth. A new hoisting plant, capable of operating to a depth of 2,500 ft., will be installed. Electric power will be put in for compressor work. Most of the ore now comes from stopes between the 400 and 1-600-ft. levels.

NEVADA.

STOREY COUNTY—COMSTOCK LODE.

Ophir Mining Co.—The Oscar Steele mining claims, known as the Ohio and the Miramar, adjoining the Ophir ground in the Comstock east country, have been deeded to the Ophir Mining Co. The deal is the sequel to a long controversy between the Ophir Co. and the former owners of the two claims. It is understood that the Ophir will do some extensive development work on the recently acquired property.

NEW YORK.

ESSEX COUNTY.

Adirondack Graphite Co.—This company is now operating its mine, near Ticonderoga, and has started up its mill at Whitehall.

OREGON.

BAKER COUNTY.

Highland.—The Highland Mining Co., of which Neil J. Sorensen is president and manager, and J. Frank Shelton, secretary, of this city, capitalized at $3,000,000, is now pushing development work. The company has spent, Manager Sorensen says, $75,000 on the ground and has approximately opened up $1,000,000 worth of ore. The Highland consists of 12 claims situated 22 miles west of Baker City, in the Rock Creek camp, at an elevation of 6,200 above the sea. The new

mill building is ready for the reduction plant and a portion of the machinery has arrived. The new mill will have a capacity of 150 tons of ore every 24 hours. It is an Elspass mill; Card, Johnson and Overstrom concentrating tables will be used with Hartz jigs. The plant is an entirely new one in this country, involving the principle of coarse concentration in order to avoid sliming. The power plant will be hydro-electric, the company owning 125 miners' inches of water in the east fork of Rock creek, with a pressure of 628 ft. The mine buildings will be lighted by electricity and electric drills will be used. Ore is being shipped from development work daily to the Sumpter smelter.

Mayflower.—By decision rendered in the Justice of the Peace Court here, A. A. Dennis and G. Ray Boggs, charged with assault with a deadly weapon, were dismissed and their $2,000 cash bail refunded. This was the result of a criminal action growing out of a quarrel which occurred in the Cornucopia Mining district, July 21, in which Pierre Humbert, M. G. Mallett and Valentine Loubenheimer—who owned and are working for the lessee of the Union-Companion mine, formerly the property of John E. Searles, of New York—attacked Manager George W. Boggs, A. A. Dennis and G. Ray Boggs, of the Mayflower mine, who were passing over the road ordinarily used to reach these properties. Humbert claimed exclusive ownership of the road. It was shown at the trial that the road had been used for 15 years by the general public. Humbert and his crowd are under bonds to appear before the grand jury at its next session. The case has excited much interest throughout the Northwest because of the prominence of the parties and the importance of the mines represented. In the meantime the Mayflower with a force of men is continuing development work and putting in its 10-stamp mill, which is being hauled over the road in dispute. The mines lie 60 miles east of Baker City. The headquarters of the companies are in Baker City.

Midway.—The Midway Mining Co., H. T. Hendrix, manager, has finished installing its air compressor and deep sinking will be resumed on this property, which is situated in the Bourne camp above Sumpter.

Tabor Fraction.—Manager Hendryx reports that the new mill will be ready to operate soon.

PENNSYLVANIA.

BITUMINOUS COAL.

Southern Connellsville Coke Co.—This company has been incorporated with $300,000 capital, to operate a tract of coal land in Nicholson township, near Uniontown. The directors are: W. C. Magee, of Pittsburg; I. W. Semens and George Whyel, S. I. Harry, Thomas Morrison, I. H. Brownfield and James Henderson, of Uniontown; and John Husband, of Mt. Pleasant.

TENNESEE.

KNOX COUNTY.

Holston Zinc Co.—This company, operating near Knoxville, and adjoining the Roseberry property, has drilled its ground to a depth of 200 ft., and has let a contract for sinking a shaft, on which work is now in progress.

Roseberry Zinc Co.—This company has spent nearly a year drilling with three machines on its property near Knoxville. The drills struck the main deposit of ore at a depth of 158 ft., and were still in it at 202 ft. The company has a shaft down 173 ft., and is drifting at that level. It is operating a concentrator on ore from this drift, and making a very close saving of the mineral; turning out a concentrate that averages better than 61% zinc.

TEXAS.

The Controllers' Department at Austin is preparing a list of the corporations and individuals who have failed to pay taxes under the Kennedy law, which went into effect July 1, 1905. Suits will be entered to forfeit the charters of the defaulters and to impose the heavy penalties provided. It is said that only one of the large Texas oil companies—the Security Oil Co., operating a refinery at Beaumont—has complied with the act. The taxes imposed will be burdensome, it being estimated that the Guffey Petroleum Co. is liable for over $100,000 per year. Several of the big corporations, including the Sun Oil Co., Higgins Oil & Fuel Co. and the Guffey Petroleum Co., have obtained a temporary injunction in the district court of Travis county, restraining the Controller from collecting the tax.

The law, as interpreted by the Attorney General, in response to the varied inquiries regarding its provisions, goes far beyond its authors' intention, in that the same oil is taxed several times, and its effect will be to levy a rate of 4 to 10% in addition to all local or other State taxes. Oil products are taxed in the possession of every person who handles them, from the time the oil is drawn from the earth until it reaches the consumer, and the tax is on the gross business transacted. Prominent among the absurdities incorporated in the bill is, that a man who owns a well not only pays a tax of 2c. on every barrel he produces, but must also pay an additional 2% for the privilege of selling it; then if this well owner is fortunate in having a short pipe line to a tank or loading rack, he encounters another tax for the privilege of piping his product. If the railway carries the same oil to a consumer, the carrier pays 2% more; if a refinery buys it, the purchaser pays another pipe-line tax of 2% and a wholesale tax of 2%, and the wholesaler to whom the refiner sells also pays another 2% tax. If the act is constitutional, it should permit Kansas and Indian Territory crude shipments to northern Texas, and also enable Northern refineries to extend their markets. It falls as heavily on the small producer as it does on the large pipe-line owners and refiners, and the latter will, as usually the case, see that the small owner bears the bulk of the added expense. It is reasonable to assume that Texas legislators would encourage the unlimited production of a cheap fuel, but they seem to class the oil industry as an enterprise to be discouraged and to think that the oil dealer (with crude at 15c.) should put up the bulk of the State's revenues.

LIBERTY COUNTY.

Dayton.—The House & Beatty well on the McLeod lease came in July 17. Reliable information as to its capacity is not yet available.

Wells drilling: Paraffine Oil Co. No. 4, down 1,025 ft.; Sun Oil Co. No. 1, down 900 ft., No. 2, just started; Paraffine Higgins, No. 1, down 800 ft. The Texas Co. and the Port Vernon Oil Co. have rigs up.

UTAH.

JUAB COUNTY.

Black Jack.—Jesse Knight, of Provo, Utah, has purchased the interests of David Evans in this property and now owns considerably more than a control. New orebodies have recently been encountered on the 1,300 and 1,400 levels.

SALT LAKE COUNTY.

Consolidated Jefferson.—The company, operating about 15 miles from Salf Lake City, at the mouth of Little Cottonwood cañon, has encountered a gold-bearing ledge containing some sensational values. Nicholas Schmittroth, of Salt Lake City, is manager.

Utah Copper Co.—A special meeting of the stockholders has been called for September 5 at Jersey City, to act upon a proposed increase of the authorized capital stock from $4,500,000 to $6,000,000, and also to act upon the authorization of an issue of $3,000,000 in 6% convertible bonds. President MacNeil, in a letter to stockholders, says: "The proceeds from the sale of the proposed issue of convertible bonds are to be utilized in the erection of another mill of a capacity of at least 3,000 tons per day, and the probabilities are the capacity may ultimately be greatly in excess of said amount; to the retirement of the present issue of 7% bonds, amounting in the aggregate to $750,000 par value; to providing working capital and for the general purposes of the company in carrying out its enlarged operations. The bonds are to be convertible at the option of the holder at any time within five years from their date into the stock of the company at the rate of $20 per share, or 50 shares of the par value of $10 each for each $1,000 bond. It will thus be seen that it is necessary to authorize an increase of the stock to pro-

vide for the retirement of the bonds, if the holders so elect. Under negotiations now in progress the company has assurances of disposing of its bonds, when authorized."

SUMMIT COUNTY.

Silver King Consolidated.—The new hoisting plant recently installed at this property is in commission. The mine is now one of the best equipped in Park City.

Ontario Tunnel.—The work of opening this adit, which was closed by caves in the latter part of March last, is progressing steadily. The tunnel has been cleared to a point 15,000 ft. in from the entrance.

TOOELE COUNTY.

Western Pacific.—This company, recently organized, has let a contract for 200 ft. of tunnel work on its Deep Creek property.

Overland.—Preparations to start the mill on this property are well under way. E. W. Clark, of Ophir, Utah, is manager.

Foreign Mining News.

CANADA.

ONTARIO.

Breitung Iron Co.—This company is now making regular shipments from its mine, which is 22 miles from the Sault, in Ontario. The ore—about 50 tons a day—is going to the furnace at the Sault. The company owns a tract of 4,000 acres, adjoining the mine. The main shaft on the property is down to a depth of 170 ft., and the upper tunnel crosscuts a 60-ft. orebody. A lower tunnel is to be driven to the main shaft, and is already advanced a distance of 75 ft. The ore is a bessemer hematite and assays from 45 to 48% iron.

Coal Trade Review.

Aug. 16.

ANTHRACITE.

The hard-coal market shows no improvement. The remaining 10c. discount has no effect whatever in stimulating a little trade before the end of the month, and consumers, outside of the regular power plants, find the weather too hot to think about fuel.

Wholesale prices remain at $4.65 for broken and $4.90 for domestic sizes, f. o. b. harbor shipping points. Steam sizes are in good supply at the same prices as last week: $3 for pea; $2.25@$2.50 for buckwheat; $1.45@$1.50 for rice, and $1.30@$1.35 for barley.

BITUMINOUS.

Reports of some improvement in the Atlantic seaboard soft-coal trade are at hand, and it is thought that this affects primarily the better grades of coal. Shippers from the Virginia capes were fully contracted, and some shippers have had difficulty keeping up with their contracts on account of a shortage of cars on the main-line roads. The Pennsylvania shippers do not seem to have felt the improvement as much as their brethren to the South. This is to be regretted and yet the railroads must undoubtedly recognize the continuance of such a condition, and will probably attend to the prevailing difference in through freight rates. The apparent difference in business between the two territories will also probably arouse sharper competition in another year. A slight congestion has occurred at the New York harbor shipping points, involving a temporary embargo upon the shipments from the mines of those who do not take prompt care of their arrivals.

Trade in the far East shows signs of improvement, while the vessel market is developing a lack of boats at most ports, and freights are advancing. This is undoubtedly due to the haste to ship coal before the fall demand begins. Trade along the Sound shows an improved, although sluggish, demand; tonnage moving forward is larger than it has been. Trade in New York harbor has had to absorb a considerable amount of coal congested at tidewater shipping points, and has done so, fairly well. Prices have been down to minimum; some coal has sold at $2.10@$2.20, which prices are below cost and cannot continue. Better grades have been getting $2.30@$2.35 f. o. b. harbor shipping points.

All-rail trade continues active, and some dealers state that they want no more of this kind of business, as it will interfere with the expected fall demand. Car supply has been reduced to some shippers who are dilatory in disposing of their arrivals. Transportation has been slow, coal taking five to seven days in coming through.

Vessels in the coastwise trade are scarce, and the demand, particularly for small sizes, is heavy. Philadelphia quotes as follows: To Boston, Salem and Portland, 65@70c.; to the Sound, 60c; to Lynn, Newburyport and Bangor, 85c.; to Portsmouth, 75c.; to Saco and Gardner, 90@95c. plus towages. New York harbor charges 50@55c. to around the Capes with small vessels in strong demand.

COAL TRAFFIC NOTES.

The coal traffic orginating on all lines of the Pennsylvania Railroad east of Pittsburg and Erie for the year to August 5 was as follows, in short tons:

	1904.	1905.	Changes.
Anthracite	2,650 369	2,748,517	I. 98,148
Bituminous	15,862,171	16,786,629	I. 924,458
Coke	4.991,211	6,478,465	I. 1.487,254
Total	23,503,751	26,013,611	I. 2,509,860

Nearly 60% of this year's increase was in coke traffic.

The production of anthracite coal by sizes in 1904 shows that 38.01% of the total was pea coal or smaller sizes. Of pea coal 14.01% was shipped; of buckwheat No. 1, 13.73%, and of sizes smaller than buckwheat, 10.27% in all. All this coal is sold at very low prices, largely in competition with bituminous coal. Besides this 1,447,549 tons of lump coal or 2.52% of the total was reported, and the prepared sizes, that is broken, egg, stove and chestnut, constituted the rest of the output. The production of coal according to sizes was:

	Tons.	Per Cent.
Lump	1,447,549	2.52
Small sizes	21,855,861	38.01
Prepared sizes	34,189,112	59.47
Total	57,492,522	100.00

The full prices usually quoted apply to the prepared sizes and lump coal, 61.99% of the sales; 38.01% is sold from $0.60 to $2.25 per ton at the mines.

Birmingham. Aug. 14.

Steady operation is noted at the Alabama coal mines. The furnace companies, whose union miners went out on strike last year, are making strong efforts to increase the output at their mines and imported labor grows every week. That there is a scarcity of coke is not denied, and much of this product is being brought to this district from West Virginia and other points.

The Pratt Consolidated Coal Co. is opening 10 or 12 new mines. Their present daily production is about 8,000 tons. The mines now in operation belonging to this company are in Jefferson county, while the new mines being opened are in Walker county. The Louisville & Nashville railroad is building an extension to the properties of the company.

The Seaboard Mining Co. has been incorporated by W. E. Fort, L. Lee, E. J. Rust, S. Johansen and M. T. Singleton. The company will mine coal in this State.

The coke production shows no change. There is plenty of room for improvement. The importation of coke is likely to be continued for some time.

Chicago. Aug. 15.

Nearly every branch of the coal business is very dull. Western coals are selling at low prices, with no prospect of a change for the better. The sales of Eastern coals are fairly good for midsummer, but business is naturally light. Nowhere except in the threshing trade is business at all brisk; the threshing demands have been somewhat heavier this year than usual, and will continue until September. Anthracite is in very light demand, and the large supply of private coal causes price-cutting to continue. One large dealer estimates that not more than 80% of the usual supply of anthracite for the period between April 1 and August 1 has been taken this year.

Illinois mines are producing so much coal that the market is almost, or quite, profitless on many consignments. Egg and lump from Indiana and Illinois mines bring $1.75@$2.20; run-of-mine, $1.40@1.65, and screenings, $1@$1.40..

Hocking is considerably cut from the $3

price, as low as $2.75 being reported made on several sales. On the high-grade Hocking, it is claimed, however, prices are being well maintained, and this is probably true, the low prices representing lower grades. Smokeless is in growing demand; the city's smoke laws are bringing it more and more into use within Chicago, and outside it is reported to have an increasing sale. But at the best the demand now is light. Youghiogheny is in light demand, though much coal is moving on contracts; for current sales it is quoted at $2.90 per ton.

Cleveland. Aug. 15.

The statement is made in coal circles that about the first of September a more lively movement of coal up the lakes will be started. It is apparent that if the normal amount of coal is to be shipped, or anything like it this season, the movement will have to start much more briskly soon. Most of the coal-loading machinery on the lakes has been idle the major part of the summer. Meanwhile the boats are plentiful and cargoes scarce. The lake rates remain as they have been, at 30c. to the head of the lakes and 40c. to Lake Michigan. Lake three-quarter coal is still selling slowly at $1.90, f. o. b. boats at Lake Erie ports.

The demand for steam coal in this territory is slow. The prices hold without change at 90@95c. at the mine for the run-of-mine.

The coke market is a little stronger, with the demand on the increase. The supply is abundant. The market is firm at $2.40@$2.50 at the oven for the best grades of foundry coke and $2 for furnace coke.

Pittsburg. Aug. 15.

Coal.—There was scarcely a change worth mentioning in the bituminous coal industry during the week. Reports from down-river points are to the effect that the fleets arrived in safety at Louisville and Cincinnati, but will not be shipped to New Orleans, owing to the yellow fever scourge.

Coke.—The coke production in the Connellsville region for the past week shows a good gain. No ovens were fired during the week, but there are now less than 200 ovens in the five-day list. Prices remain practically unchanged at $2@$2.20 a ton for furnace coke and $2.60@$2.80 for foundry. A summary for the region shows a total of 22,833 ovens, of which only 2,581 are idle. The week's output, estimated upon the number of ovens drawn, amounted to 251,995 tons, an increase over the previous week of 3,216 tons. The shipments aggregated 10,775 cars, distributed as follows: Pittsburg district, 4,091 cars; western district, 5,453 cars, and eastern district, 1,211 cars. The shipments from the Masontown field aggregated 2,253 cars. The total shipments from the two fields amounted to 314,822 tons.

San Francisco. Aug. 10.

J. W. Harrison's circular of this date says: "Deliveries of Australian coal since our last have been three cargoes; total, 8,900 tons. There are very few names of vessels being added to the coal loading list in Australia, which at present foots up 20 vessels, with a carrying capacity of about 55,000 tons. A large portion of this list will not be due here before the end of this year. The total coal arrivals for July this year amount to 38,185 tons; for the same month last year they amounted to 55,234 tons, showing a marked shrinkage. Business in the fuel line is very dull; prices remain unchanged, but sales are very light. The spring weather now prevailing materially reduces the consumption for household purposes, and fuel oil is the principal factor in furnishing steam requirements. Labor troubles at some of the collieries in British Columbia still exist, although an early settlement is promised; the market prices here have not been disturbed, as the other sources from which we derive our British Columbia supplies are ample to keep our market here fully provided for. Outward grain freights are not showing any improvement; this will serve to deter coal loading vessels from seeking this port for profitable business, unless they should receive generous compensation for the carriage of the coal, which is improbable, with the present condition of our market."

For Coast coals, in large lots to dealers, prices are as follows: Wellington, New Wellington and Richmond, $8; Roslyn, $7; Seattle and Bryant, $6.50; Beaver Hill and Coos Bay, $5.50; White Ash, $5.25. For Rocky Mountain coals, in car lots, quotations are: Colorado anthracite, $14; Castle Gate, Clear Creek, Rock Springs and Sunny Side, $8.50. Eastern coals are nominal at $14 for Pennsylvania anthracite, and $13 for Cumberland. For foreign coal quotations are, ex-ship: Welsh anthracite, $13; cannel, $8.50; Wallsend and Brymbo, $7.50 per ton.

Foreign Coal Trade.

Aug. 16.

Exports of fuel from Germany for the six months ending June 30 were as follows, in metric tons:

	1904.	1905.		Changes.
Coal	8,563,695	8,191,751	D.	371,944
Brown coal	11.363	10,545	D.	818
Coke	1,331,074	1,261,429	D.	69,645
Total	9,906,132	9,463,725	D.	442,407

The more important exports of coal were to Austria, Holland and Belgium; of coke to France and Austria. Exports to the United States this year were 11,675 tons of coke.

Imports of fuel into Germany for the half-year were as follows, also in metric tons:

	1904.	1905.		Changes.
Coal	3,121,076	4,819,006	I.	1,697,930
Brown coal	3,799,851	3,920.718	I.	120,867
Coke	255,846	363,128	I.	107,282
Total	7,176,773	9,102,852	I.	1,926,079

The chief imports of coal were from Great Britain; of brown coal, or lignite, from Austria. The increase in imports was due to the coal strike.

The production of coal in Germany for the first half of the year was as follows, in metric tons:

	1904.	1905.		Changes.
Coal	58,825,710	56,630,591	D.	2,195,119
Brown coal	23,251,206	24,944,082	I.	1,692,876
Total mined	82,076,916	81,574,673	D.	502,243
Coke made	5,999,402	6,554,776	I.	555,374
Briquettes made.	5,439,468	6,077,639	I.	638,171

Of the coal mined 52,642,163 tons, and of the brown coal 21,086,899 tons were from the mines of Prussia.

Iron Trade Review.

NEW YORK, Aug. 16.

A degree of quiet prevails in the iron trade, so far as new business is concerned. There has been less buying, and less new contracting. This does not imply a subsidence of activity, for most furnaces and mills have work enough ahead to satisfy them for the time. The lull rather signifies that large buyers have now their requirements filled, and will do nothing more for the present. The extremely hot weather over a large part of the country has also had some effect.

The strike of the bridge-workers has not been settled; there seems to be some doubt as to how far it will extend. It is causing some temporary embarrassment in construction contracts.

The rail orders which have been quietly placed have filled the mills up pretty well for the balance of the year. Some large orders for steel cars are still under negotiation.

Pig Iron Production.—The weekly capacity of the coke and anthracite furnaces in blast on Aug. 1 is estimated at 410,100 tons, an increase of 1,500 tons over July 1. It is 41,900 tons less than the maximum reached on May 1. The charcoal furnace capacity will bring the total up to 438,500 tons weekly. *The Iron Age* estimates the coke and anthracite production in July at 1,741,950 tons. Adding the output of the first half of the year, as reported by the American Iron & Steel Association, and allowing for charcoal iron in July, gives a total of 12,934,125 tons of pig iron for the seven months ending with July.

The unsold stocks on Aug. 1 are estimated at 500,600 tons; an increase of 25,700 tons over July 1, and of 181,350 tons as compared with Jan. 1. These stocks do not include iron held by the steel companies for their own use.

Birmingham. Aug. 14.

Southern pig-iron manufacturers are holding their iron for the regular quotations, except in a few cases where low

grades have been sold under the published prices. No. 1 soft is so scarce that 50c. per ton in advance of the regular quotations is being received for the product. A large amount of No. 1 and No. 2 foundry has been sold already, delivery during the next two months, while a number of sales have been made for delivery during the last quarter of the year. The railroads are not in position to furnish all the cars necessary in the handling of iron as promptly as might be desired, but the furnace companies are not able to get all necessary labor, either, to load the cars.

The Sloss-Sheffield Steel & Iron Co. will blow in North Birmingham furnace tomorrow.

The following quotations for pig iron are given: No. 1 foundry, $12.50; No. 2 foundry, $12, firm; No. 3 foundry, $11.50; No. 4 foundry, $11; gray forge, $10.50@$10.75; No. 1 soft, $12.50@$13; No. 2 soft, $12.

There is a strong demand for steel and steel products. The steel rail production for several months to come at the Ensley plant of the Tennessee Coal, Iron & Railroad Co. is sold ahead. The Alabama Steel & Wire Co. is operating its plant on full time, both at Gadsden and at Ensley.

In rolling-mill circles steady operation is announced at Bessemer, Gate City and Sheffield. At the latter place the mills are working day and night on orders for cotton ties.

Chicago. Aug. 15.

The iron business of the last week, though not large, has been fairly satisfactory to the trade, considering that this is the middle of August, and by all traditions the dullest period of the year. Sales have been neither for large quantities nor very numerous, but inquiries are somewhat heavy, indicating that there is no probability of a decided falling off in business. With buyers and sellers of iron quite generally out of town, the trade rests until September, in the hope that every branch of the business will be better then. Compared with previous midsummer seasons the present appears to be neither better nor worse than the average for several years.

Southern is selling close to the $12 Birmingham figure, or $15.65 Chicago. Northern brings about $16.50, both quotations being for No. 2 iron. Lake Superior charcoal iron, not in large supply or demand, is selling for $17.

Most of the business now being done is in 60 to 90-day lots, but some contracts are being made for the first quarter of next year. Neither buyers nor sellers seem to attach as much importance as usual to the imaginary boundary between the current and the coming year, in contracts, and neither class expresses apprehension that there will be any serious check in the general prosperity of the country, or in the iron trade particularly.

Sales of finished products have been fairly good, though these are somewhat quieter than two or three weeks ago. No branch of the finished products trade has been really dull.

Coke is rather dull, the supply being ample and the buying only moderate. Connellsville 72-hour brings $4.90 and standard cokes 25@50c. less.

Cleveland. Aug. 15.

Iron Ore.—The movement of ore during the past week has been a little heavier than usual, with wild boats more in demand and all of the contract tonnage busy. The rates of carriage have remained firm at 75c. from the head of the lakes; 70c. from Marquette, and 50c. from Escanaba. The demand for ore has been only fair, with but little buying, although prices have held firm at $3.75 for bessemer Old Range; $3.50 for bessemer Mesabi; $3.25 for non-bessemer Old Range; $3 for non-bessemer Mesabi.

Pig Iron.—The market has been listless throughout, with buying limited, but prices steady. Many furnaces are in such shape that it is imperative that they get business; the result is that prices have not strengthened. Some furnaces have continued to sell material at $14@$14.25 in the Valleys for No. 2 foundry, while others, having a better run of orders, are holding for $14.50 and better. The market for bessemer, basic and malleable is in about the same position, with very light buying and a difference of opinion as to what the price ought to be. Some iron has sold as low as $14 in the Valleys, while other producers have been able to get $14.25.

Finished Iron and Steel.—The structural supply is so short that some of the mills have not been able to meet the demands of their best customers, who have gone first to the smaller mills and then to the jobbers to get their material. The smaller consumers fare no better, and premiums of $5@$7 a ton have been common. The bigger bar buyers have about closed contracts covering their needs, and the smaller consumers are now coming into the market for what they require. Billets are stronger, and premiums are again being paid, the price on bessemer 4 by 4's holding at $24@$25 Pittsburg. Sheet prices are still cut to get business.

New York. Aug. 16.

Pig Iron.—While buying has been less active, there is still a considerable demand. Prices are unchanged, but there is a tendency to the upper level, and no concessions are made.

For Northern iron in large lots we quote: No. 1 X foundry, $16.25@16.75; No. 2 X, $15.75@$16.25; No. 2 plain, $15.25@$15.75; gray forge, $14.25@$14.75. Virginia foundry is $16.90 for No. 1 and $16.40 for No. 2. Southern iron is firm on a basis of $12.50@$13, Birmingham, for No. 2. For large lots here on dock we quote: No. 1 foundry, $16@$16.50; No. 2 $15.50@$16; No. 3, $15@$15.50; No. 4, $14.50@$15; No. 1 soft, $16@$16.50; No. 2 soft, $15.50@$16; gray forge, $14@$14.50 per ton.

Business on the Produce Exchange is quiet. Latest quotations for September and October are $14.85 bid, $15.20 asked, for regular warrants; $15 bid, $15.50 asked, for foundry warrants.

Cast Iron Pipe.—Orders indicate a good fall trade, and the makers are all full of work. Current quotations for carload lots are on a basis of $27 per net ton, 6-in. pipe, at tidewater.

Bars.—Bar iron is selling well and there is talk of higher prices. Quotations are firm at 1.645c., large lots on dock. Steel bars are 1.645c. Store trade is fair, with quotations 1.75@2c. delivered.

Structural Material.—Business continues good in small orders coming to jobbers. Premiums are being asked for early deliveries. Beams under 15-in. are 1.745c. for large lots; over 15-in. 1.845c.; angles and channels, 1.745c., tidewater delivery. Large orders are not closed here, as a rule, but directly with mills.

Plates.—Plates are in steady demand in small lots. Tank plates are 1.745@1.795c.; flange and boiler, 1.845@1.945c.; universal and sheared plates, 1.645c. up, according to width.

Steel Rails.—No change in standard sections. Light rails are quiet, prices ranging from $20.50 for 35-lb., up to $24.50 for 12-lb. rails.

Old Material.—The market is active, and prices are strong, but without much change. No. 1 railroad wrought brings around $16.50@$17.50; No. 1 yard wrought, $14.50@$15; machinery cast, $13.50@$14. There is demand for heavy steel melting scrap, and sales are made at $14.50@$15. These prices are on cars, Jersey City, or other terminal delivery.

Philadelphia. Aug. 16.

The most active iron for the past week or two in this market has been basic, concerning which it is estimated that upward of 100,000 tons have been contracted for recently, and much of it for the earliest possible delivery. A considerable portion of this material, however, will not be wanted until the early months of next year. It cannot be ascertained what the contract price is, but the makers of the iron say they are quite satisfied with the terms. It is understood today that more negotiations have been started for basic, but the only hitch is the higher price which has been named by the makers. In other kinds of iron, such as forge, a fair business has been done, but the foundry grades are meeting with more favor and some of the contracts placed within a week are quite large. A good deal of

pig iron is being contracted for in Alabama and Virginia, but our eastern Pennsylvania furnaces are not at all worried, as they have all the business they can handle and the assurances of a good deal more during the next two or three months. Quotations for No. 1 foundry may be fairly given at $17.50; No. 2 X, $16.50; No. 2 plain, $16; standard gray forge, $15; basic, $15; low phosphorus, $20.50; Southern No. 2 by rail, $15.75.

Billets.—Open-hearth billets are quoted at $26.50; steel billets are selling well.

Bars.—Car-lots of iron and steel bars are quoted at 1.63½ up, and for common iron concessions have been offered this week. It is evidently the purpose of some of the larger mills to secure as much business during the summer as possible.

Sheets.—The past week or so has been unfavorable to business, and the explanation given is the rumor that competition has sprung up between Western and Eastern mills for some big slices of business for winter delivery.

Pipes and Tubes.—The tone of the market is reported very strong by those in a position to know.

Merchant Steel.—Merchant steel is moderately active in this market, but the requirements for the coming few months are not being covered.

Plates.—The anticipated requirements of the Pennsylvania Railroad Co. for cars are having an influence on the plate market. Should the immense order be placed which it is said is practically assured, it will do away with all concessions which are now quietly made on large lots.

Structural Material.—The most active demand in structural material this week is for small operations, such as for warehouse work, office buildings, etc. The threatened strike is attracting a good deal of attention.

Steel Rails.—Inquiries reported today foot up at least 60,000 tons, but this is supposed to be below the actual volume under inquiry.

Old Material.—The old material market is in excellent shape and prices for certain kinds of scrap have moved up about 50c. per ton where a customer comes along who is obliged to have material. For No. 1 steel scrap $16.25 is asked; for old car wheels $16; machinery scrap $15; yard scrap, $17, and axle turnings, $14 per ton.

Pittsburg. Aug. 16.

There is very little new in the iron and steel market, and the tone has scarcely improved from last week, there being less activity, with a tendency to dullness in some lines.

The local pig iron market has been particularly quiet, buyers having become further imbued with the idea that prices may work to a slightly lower level, not necessarily below the low point of the past few months, but still somewhat lower than the present. In finished materials the lines which have been quiet have not opened up much , while those which have been active are quieter; this including plates and structural shapes in particular. The season business in these has been done, and it is simply a case of the mills running full until nearly ir not quite the close of the year, in order to fill the specifications already in hand. In sheets there is hardly more business going, and prices, if anything, are a trifle weaker. Tinplates show no better demand, the market being decidedly dull.

The prospects in the wire trade are better. There is a fair amount of business being booked and the outlook is improved by the fact that producers are adhering rigidly to the nominal prices, according to the agreement made a couple of weeks ago. Indeed, there are some reports that an advance may be ordered, say at the beginning of next month, or during the month, after the large buyers have been let in at present prices.

The strike of outside structural iron workers has held business back somewhat, but hopes are still entertained that the difficulty will be adjusted without serious disturbance.

No large business has been done in rails in the past week, the mills being already booked up very fully for seasonable deliveries, and having almost enough tonnage to carry them through the year. With a very moderate amount of new business in the next few months they will be forced to carry some tonnage into 1906.

Pig Iron.—No sales of importance have been made in this district in the past week, although in other sections it is reported that pig iron has been moderately active. There are current sales of small lots of foundry iron, from carloads to a few hundred tons, at $14.25@$14.50, furnace. or $15.10@$15.35, Pittsburg. In forge the last sale was at $14.45, Pittsburg, and some small tonnage is now under negotiation, with the probability that the price will be about $14.50, delivered Pittsburg. In bessemer a sale is reported at $14.75, furnace, for shipment clear through the year, but the report cannot be verified. The last verified sales were of prompt bessemer at $14.25, Valley furnace, but on extended delivery it is possible that a higher price could be obtained. Producers are quoting $14.50, furnace, or $15.35, Pittsburg, on early deliveries.

Steel.—There has been a moderate turnover of steel, both in billets and sheet-bars, but the total has not been large, mills having little steel to spare, and the class of mills buying steel in the open market being less busy than others. The market, however, is firmly maintained at $24 for bessemer billets, $25 for long sheet-bars and $25.50 for sheet-bars cut to specifications, all f. o. b. Pittsburg. Open-hearth billets are quoted at about $25, and forging billets at $26@$27. Merchant steel bars continue to be sold in good volume at 1.50c., Pittsburg. Plates are unchanged at 1.60c. on ordinary deliveries, while premiums are sometimes paid on prompt lots.

Sheets.—The shading in sheets seems to be more pronounced, with prices about back to the low point, after the slight firmness late in July. On carloads for mill shipment, with favorable specifications, it is possible to do $1 a ton lower than quoted a week ago, or 2.30c. on black and 3.35c. on galvanized, No. 28 gauge. On a large tonnage for early shipment these prices could be shaded somewhat. The mills are running about the same as last reported, about 60% of the leading interest's capacity being active, and perhaps a slightly greater proportion of the independent capacity. In tin-plate the leading interest this week started the remaining mills at the Greer plant, at New Castle, and may start the Shenango tin mill, also at New Castle, within a week or two. The bulk of its tin-plate capacity is still idle. Of the independent tin-plate producers, all but one are running part or full time.

Ferro-manganese. — The market continues quiet, with carloads and small lots at $49@$50, delivered, and large lots at $48 or a trifle less.

Dusseldorf, Germany. Aug. 5.

Exports and Imports.—Exports of iron and steel from Germany, including machinery, for the half-year ending June 30, are reported as follows, in metric tons:

	1904.	1905.	Changes.
Pig iron.....	115,897	160,812	I. 44,915
Other iron and steel.	1,300,004	1,325,124	I. 25,120
Total.....	1,415,901	1,485,936	I. 70,035

Exports of iron ores for the half-year were 1,719,283 tons in 1904, and 1,773,522 tons in 1905; an increase of 54,239 tons. These exports were chiefly to France and Belgium, and were nearly all minette ores from Luxemburg. Exports of slag products, chiefly slag wool, were 16,642 tons in 1904, and 11,628 tons in 1905; a decrease of 5,014 tons.

There were small exports of manganese ores, 1,418 tons in 1904 and 1,135 tons this year.

Imports of iron and steel, including machinery, for the half-year were as follows, in metric tons:

	1904.	1905.	Changes.
Pig iron.....	93,688	67,843	D. 25,845
Other iron and steel..	87,777	80,122	D. 7,655
Total.....	181,465	147,965	D. 33,500

Imports of iron ore was 2,725,852 tons in 1904, and 2,680,234 tons in 1905; a decrease of 45,618 tons. The ores received were chiefly from Spain and Sweden. Imports of slag products were 440,095 tons in 1904, and 437,800 tons in 1905; a decrease of 2,295 tons.

Imports of manganese ore were 149,770 tons in 1904, and 121,993 tons in 1905; a decrease of 27,777 tons. These ores came from Spain and Russia, for the most part.

Pig Iron Production.—The German Iron & Steel Union reports the output of pig iron for June at 918,174 tons, a decrease of 33,257 tons from May. For the half-year ending June 30 the production was as follows, in metric tons:

	1904.	1905.	Changes.
Foundry iron	898,890	869,397	D. 29,493
Forge iron	411,436	399,528	D. 11,908
Steel pig	293,813	319,751	I. 25,938
Bessemer pig	220,873	190,807	D. 30,066
Thomas pig	3,174,401	3,319,105	I. 144,704
Total	4,999,413	5,098,588	I. 99,175

The increase was almost entirely in Thomas, or basic, iron, the staple German product. The gain was made this year notwithstanding the losses caused by the coal strike early in the year. Steel pig, under the German classification, includes spiegeleisen, ferromanganese, ferrosilicon and all similar alloys.

Cartagena, Spain. July 29.

Iron and Manganiferous Ores.—Messrs. Barrington & Holt report that the shipments for the week were two cargoes, 5,050 tons dry ore, and three cargoes, 5,380 tons manganiferous ore, to Great Britain; one cargo, 2,200 tons manganiferous ore, to Rotterdam. The market continues good.

Quotations are unchanged: Ordinary 50% ore is 6s. 4d.@6s. 7d.; special low phosphorus, 6s. 10d.@7s. 6d.; specular ore, 58%, 9s. 6d.; S. P. Campanil, 9s. All prices are f. o. b. shipping port. Manganiferous ores, same terms, range from 9s. 9d. for 35% iron and 12% manganese, up to 14s. 6d. for 20% iron and 20% manganese.

Pyrites.—Iron pyrites, 40% iron and 43% sulphur, are quoted at 10s., f. o. b. shipping port.

Heavy Chemicals and Minerals.

NEW YORK, Aug. 16.

(For other prices of chemicals and minerals, see large table on page 336.)

Prime sulphur (both Louisiana and Sicilian) is quoted in New York, Boston and Portland at $19.50; in Philadelphia and Baltimore at $20. Pyrite continues unchanged at 10@11c. per unit of sulphur for lump ore, with 25c. additional for breaking to furnace size; 9.5@10c. for fines f.o.b. Atlantic ports. Domestic pyrite sells at 11c. per unit for furnace size, and 10c. for fines f.o.b. shipping point. Market even, with no stocks accumulated.

Messrs. J. M. Lang & Co. report that shipments of phosphate rock through the port of Savannah in July were 5,865 tons, of which 3,763 tons went to Germany, 698 tons to Austria and 1,419 tons to Italy.

Messrs. Emil Fog & Sons report from Messina, Sicily, that sulphur is selling freely, except for shipment to the United States. Exports in June were 25,839 tons, of which 8,984 tons went to the United States. For the half-year ending June 30 the total exports were 303,915 tons in 1904, and 291,073 tons in 1905; a decrease of 12,842 tons. The stocks in Sicily on July 1 were 324,430 tons, an increase of 46,005 tons over those reported on the corresponding date last year.

PRICES.

Acids.		
Boric, crystals	per lb.	.10
powdered	"	.10½
Carbonic, liquid gas	"	.12½
Hydrofluoric, 30%	"	.03
48%	"	.05
60%	"	.11
Nitric acid, 36°, 100 lb.		$4.75
38°, 100 lb.		5.25
40°, 100 lb.		5.50
42°, 100 lb.		5.75
Oxalic acid, com'l, 100 lb		$5.00@ 5.25
Sulphuric acid, 50°, bulk, ton		13.50@14.50
60°, 100 lb. in carboys		1.05
60°, bulk, ton		18 00@20.00
66°, 100 lb. in carboys		1.20
66°, bulk ton		21.00@23.00
Blue Stone (Copper Sulphate), car-load lots, per 100 lb		4.90
Nitrate of Soda, 100 lb		2.22½@2.17½
Sulphate of Ammonia, per 100 lb		3.10@ 3.15

Phosphates.	F. o. b.	C. I. F. Gt. Britain or Europe.
*Fla., hard rock	$7.25@7.50	$10.67@11.85
land pebble	3.75@4.00	7.70@ 8.40
†Tenn., 78@80%	4.35@4.40	10.27@10.67
78%	3.75@4.00	.....
75%	3.40@3.50	.....
68@72%	3.00@3.25	.....
‡So. Car. land rock	3.75@4.00	.....
river rock	3.50@3.75	6.33@ 6.61
Algerian, 63@70%		7.04@ 7.71
58@63%		6.15@ 6.60
Tunis (Gafsa)		6.00@ 6.60
Christmas Isle		13.28@14.11
Ocean Isle		13.60@14.45
Somme, Fr.		11.39

*F. o. b. Florida or Georgia ports. †F. o. b. Mt. Pleasant. ‡On vessel Ashley River, S. C.

Metal Market.

New York, Aug. 16.

Gold and Silver Exports and Imports.

At all United States Ports in June and Year.

Metal.	June.		Year.	
	1904.	1905.	1904.	1905.
Gold Exp	$1,522,544	$4,030,881	$68,449,393	$39,831,590
Gold Imp	4,886,233	2,137,952	43,713,726	16,598,354
Exc Gold	I. $3,363,689	E. $1,892,930	E. $20,685,667	E. 23,233,236
Silv. Exp	4,410,634	4,744,625	26,367,699	25,081,266
Silv. Imp	2,752,401	2,301,596	13,775,600	15,118,941
Exc Silv.	E. $1,658,233	E. $2,443,029	E. $12,592,099	E. $9,962,325

These exports and imports cover the totals at all United States ports. The figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Exports and Imports, N.Y.

For the week ending August 12, and for years from January 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week	$2,900	$19,371	$1,087,247	$20,072
1905	37,929,843	971,929	20,138,961	2,337,388
1904	66,741,579	3,661,385	25,054,124	595,068
1903	32,162,749	3,628,282	12,584,348	1,283,695

Imports for the week were from Mexico and the West Indies; exports of gold were to the West Indies; of silver to Great Britain.

The statement of the New York banks—including all the banks represented in the Clearing House—for the week ending Aug. 12 gives the following totals, comparison being made with the corresponding week of 1904:

	1904.	1905.
Loans and discounts	$1,096,491,400	$1,139,891,400
Deposits	1,207,132,500	1,186,659,200
Circulation	38,293,500	50,467,500
Specie	276,854,900	221,391,000
Legal tenders	82,659,700	88,120,600
Total reserve	$359,514,600	$309,511,600
Legal requirements	301,783,125	296,664,800
Balance surplus	$57,731,475	$12,846,800

Changes for the week this year were increases of $683,275 in surplus reserve and $977,200 in circulation; decreases of $713,300 in loans, $6,272,300 in specie, $1,220,200 in legal tenders and £10,467,100 in deposits.

The following table shows the specie holdings of the leading banks of the world. The amounts are reduced to dollars:

	Gold.	Silver.
New York Associated	$221,391,000	.....
England	181,486,645	.....
France	591,217,035	$222,013,695
Germany	177,985,000	59,330,00
Spain	74,475,000	111,430,000
Netherlands	32,462,500	30,997,500
Belgium	16,400,000	8,200,000
Italy	122,605,000	16,533,500
Russia	560,400,000	29,455,000
Austria	233,965,000	63,620,000

The returns of the Associated Banks of New York are of date Aug. 12 and the others Aug. 10. The foreign bank statements are from the *Commercial and Financial Chronicle*, of New York.

Shipments of silver from London to the East for the year up to Aug. 3 are reported by Messrs. Pixley & Abell, as follows:

	1904.	1905.	Changes.
India	£6,297,138	£4,058,641	D. £2,238,497
China	372,722	749,394	I. 376,672
Straits	58,103	2,800	D. 55,303
Totals	£6,727,963	£4,810,835	D. £1,917,128

Receipts for the week were £158,000 from New York and £4,000 from Australia; £162,000 in all. Exports were £122,300 all to India.

Indian exchange is firmer and the demand for bills has been good. The Council bills offered in London were all taken at an average of 16.03d. per rupee. Some gold is going from Australia to India.

SILVER AND STERLING EXCHANGE.

August.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.	August.	Sterling Exchange.	Silver. New York. Cents.	Silver. London, Pence.
10	4.8645	59¼	27 5/16	14	4.8650	59¾	27 5/16
11	4.8650	59⅜	27 5/16	15	4.8650	59⅞	27 5/16
12	4.8650	59⅝	27½	16	4.8650	60⅛	27¾

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver, .925 fine

The silver market has been a strong and advancing one the past week, due to good demand on Indian account, coupled with buying for Continental markets.

Prices of Foreign Coins.

	Bid.	Asked.
Mexican dollars..	$0.46	$0.48
Peruvian soles and Chilean pesos..	.42	.45
Victoria sovereigns	4.86	4.87½
Twenty francs.	3.87	3.90
Spanish 25 pesetas	4.78	4.82

Other Metals.

Daily Prices of Metals in New York.

August.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
10	15⅛ @15⅜	15⅜ @15½	69	32¾	4.60	5.70 @5.75	5.55 @5.60
11	15¼ @15⅜	15⅜ @15½	69¼	32¾	4.60	5.70 @5.75	5.55 @5.60
12	15⅜ @15½	15½ @15⅝	....	32¾	4.60	5.70 @5.75	5.55 @5.60
14	15⅜ @15½	15½ @15⅝	69¼	32½	4.60	5.70 @5.75	5.55 @5.60
15	15⅜ @15½	15½ @15⅝	69½	32⅞	4.60	5.70 @5.75	5.55 @5.60
16	15⅜ @15½	15½ @15⅝	69½	32⅞	4.60	5.70 @5.75	5.55 @5.60

London quotations are per long ton (2,240 lb.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars.

Copper.—There is no material change in the position of this metal. While pricse improved somewhat during the week, this is not so much due to an increased inquiry, as to the fact that but small quantities of copper are available for near-by shipment. We quote at the close 15⅝@15¾c. for lake; 15½@15¾c. for electrolytic in cakes, wire bars or ingots; and 15⅛@15¼c. for casting copper.

The standard market has been without any special feature, and closes somewhat higher at £69 5s., for both spot and futures.

Refined and manufactured sorts we quote: English tough, £71@£71 10s.; best selected, £75@£73 10s.; strong sheets, £79; India sheets, £75; yellow metal, 6¾d.

Statistics for the first half of the month show an increase of 600 tons.

Exports of copper from New York for the week were 5.442 long tons. Exports from Baltimore for the week are reported by our special correspondent at 1,861 long tons.

Imports and exports of copper in Germany for the six months ending June 30 were as follows, in metric tons:

	1904.	1905.	Changes.
Imports	53,416	49,931	D. 3,485
Exports	1,822	3,316	I. 1,494
Net imports	51,594	46,615	D. 4,979

Imports of copper ore were 3,525 tons in 1904, and 2,738 tons in 1905. Exports of ore were 9,188 tons in 1904, and 17,093 tons this year.

Tin.—The London market has recovered from its recent weakness and prices close firm at £149 15s. for spot and £149 for three months. The fact that the backwardation on three months tin is growing smaller is an indication of the confidence on the part of London speculators in the position of the metal.

Business here has been uninteresting and quotations have fluctuated between 32¾ and 32⅞ cents.

Imports of tin into Germany, with re-exports of imported metal, for the six months ending June 30, were as follows, in metric tons:

	1904.	1905.	Changes.
Imports	7,179	6,846	D. 333
Re-exports	1,417	1,315	D. 102
Net imports	5,762	5,531	D. 231

Imports of tin ore and concentrate are not reported.

Lead.—The market is quiet and prices are unchanged at 4.52½c. St. Louis and 4.60c. New York.

The London market continues steady and closes somewhat higher at £13 18s. 9d for Spanish and £14 1s. 3d. for English lead.

Imports and exports of lead in Germany for the six months ending June 30 were as follows, in metric tons:

	1904.	1905.	Changes.
Imports	31,353	42,887	I. 11,534
Exports	12,370	9,840	D. 2,530
Net imports	18,983	33,047	I. 14,064

Imports of lead ores were 44,626 tons in 1904, and 38,089 tons in 1905; a decrease of 6,537 tons. Exports of ore were 472 tons in 1904, and 739 tons this year.

St. Louis Lead Market.—The John Wahl Commission Co. telegraphs us as follows: Lead is firm, but quiet. Ordinary Missouri brands and desilverized are 4.52½c. Southwest Missouri corroding lead is 4.60c. basis.

Spanish Lead Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of July 29, that silver has been 14.25 reales per ounce, and exchange 33.21 pesetas to £1. Local quotation for pig lead is 75.25 reales per quintal, equal, on current exchange, to £12 13s. 4d. per long ton, f. o. b. Cartagena. Shipments for the week were 479 tons argentiferous and 65 tons desilverized, all to Marseilles.

Spelter.—The condition of the ore market still exercises its influence upon the price of spelter, which has advanced further, the close being strong at 5.55@5.60c. St. Louis and 5.70@5.75c. New York.

The London market is reported as being very much firmer, owing to a largely increased demand, which is expressed in an advance in the quotation to £24 12s. 6d. for good ordinaries and £24 17s. 6d. for specials.

St. Louis Spelter Market.—The John Wahl Commission Co. telegraphs us as follows: Spelter is strong and fairly active. Latest sales here are on a basis of 5.62½c., East St. Louis.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of July 29, that prices continue nominally 75 fr. for blende, 35% zinc, and 55 fr. for calamine, 30% zinc. The market is very dull, however, and inclined to be weak. Shipments were 1,000 tons blende to Antwerp.

Antimony.—The market is unchanged and quotations vary from 13½@14½c., depending upon brands and deliveries.

Nickel.—Quotations for large lots, New York or other parallel delivery, are 40@47c. per lb., according to size and condition of order. For small quantities, prices range from 48 up to 60c., also according to size of order and deliveries.

Imports of nickel into Germany for the six months ending June 30 were 767 metric tons in 1904, and 989 tons in 1905; an increase of 222 tons. Exports for the same period were 462 tons in 1904, and 505 tons in 1905; an increase of 43 tons.

Platinum. — Quotations are firm at $20.50 per oz. Gas-engine sparking points vary from 87c. for "A," to $1.80 for "B."

Platinum in manufactured forms is strong. Messrs. Eimer & Amend, of New York, quote for different forms as follows: Heavy sheet and rod, 75c. per gram; foil and wire, 80c.; crucibles and dishes, 85c.; perforated wire, 90c.; and cones, $1 per gram.

Quicksilver.—Quicksilver is unchanged; large quantities can be had at $40.50 per flask; small orders are placed at $41@$41.50. San Francisco prices are unchanged, $39 being asked for domestic orders. Export business can be placed at $37.50@$38 per flask. The London price is steady at £7 7s. 6d. per flask, from both first hands and jobbers.

Imports of quicksilver into Germany for the six months ending June 30 were 343 metric tons in 1904, and 389 tons in 1905; an increase of 46 tons. Exports were 29 tons in 1904, and 19 tons in 1905; a decrease of 10 tons.

Manganese Alloys.—Prices for manganese alloys in Germany are given by Paul Speier as below. The prices are for orders of not less than 500 kg., delivered in Bremen, and are as follows, per 100 kilograms:

	Marks
Manganese Copper, No. 1, 30% Mn	265
No. 2. 28% Mn	175
No. 3, 20 to 25%	165
Manganese Tin, No. 1, 55% Mn., no iron	365
No. 2, 55% Mn., some iron	225
Manganese Nickel, No. 1, free of iron	450
No. 2, traces of iron	270

Manganese metal is quoted at 3.60 marks per kg.—38.8c. per lb.—delivered in Bremen.

Minor Metals.—For minor metals and their alloys, wholesale prices are f. o. b. works:

Aluminum.	Per lb.
No. 1 90% ingots	33@37c.
No. 2, 99% ingots	31@34c.
Rolled Sheets	4c. up.
Aluminum-Bronze	20@23c.
Nickel-alum	33@39c.
Bismuth	$2.10
Cadmium, f. o. b. Hamburg	77c.
Chromium, pure (N. Y.)	80c.
Copper, red oxide	50c.
Ferro-Molybdenum (50%)	$1.00
Ferro-Titanium (20@25% N. Y.)	75c.
Ferro-Chrom. (74%)	12½c.
Ferro-Tungsten (37%)	45c.
Magnesium, pure (N. Y.)	$1.60
Manganese (98@99% N. Y.)	75c.
Manganese Cu. (30@70% N. Y.)	40c.
Molybdenum (98@99% N. Y.)	$2.75
Tantalic acid (N. Y.)	50c.
Thallium, f. o. b. Breslau, Germany.	65@70c.
Phosphorus, foreign	45c.
Phosphorus, American	70c.
Tungsten (best)	$1.25

Variations in prices depend chiefly upon the size and conditions of orders.

Missouri Ore Market.

JOPLIN, Aug. 12.

The highest price reported paid for zinc ore was $59 per ton, an increase of $3 per ton over the previous week and an increase since the middle of June of $15.50 per ton. It is $18 per ton higher than a year ago. Prices reached the maximum on Thursday, when it developed that only four of the smelters remained in the scramble (it could scarcely be called anything else) for zinc ore, while the others purchased only what ore came to them at the prices of the previous week. These were even lowered on Saturday, and as a consequence there are a number of disappointed sellers, who expected prices to keep going on up indefinitely. It was noted in the JOURNAL that some of the smelters had signified a determination to put a portion of their works on dead fire, considering the loss less than to continue paying prices beyond reason. The better informed producers, while they are always willing to accept all that is offered them, realize that prices are too high, and will be ready and willing to accept slight reductions for several weeks. It is possible that reductions may not come lightly each week, as one smelting agency announced a $47 basis at the end of this week, with prospects of lowering this price next week. Ore was purchased at prices equivalent to a basis of $54 per ton of 60% zinc, but no basis was observed in the cases of the sharply contested bins of ore, and the only basis announced was that of $47 today. This would indicate a slump of $7 per ton in the basis price, but will hardly be observed for the better grades, although it may be enforced on small lots of medium and lower grade ores, for which the competition is not so strong. The company that announced the $47 basis today paid the equivalent of a $52 basis early in the week. The average price paid for all grades of zinc blende and silicate was $50.30 per ton.

Following are the shipments of zinc and lead for the week:

	Zinc, lb.	Lead, lb.	Value.
Joplin	2,711,270	200,070	$81,915
Carterville-Webb City	1,629,620	568,830	59,435
Galena-Empire	386,020	124,660	14 730
Duenweg	591,170	253,810	22,985
Aurora	896,710	.....	18,370
Neck City	236,700	.....	6 630
Oronogo	355,760	34,660	8 620
Alba	402,300	.....	11,255
Spurgeon	42,180	.....	840
Granby	525,000	40 000	9,100
Pro-perity	154,680	101,400	7 060
Carthage	189,970	.....	5,320
Badger	202,230	.....	5,460
Springfield	83,450	.....	2,330
Beet Branch	96,610	13,270	1 780
Central City	60,660	.....	1,580
Totals	8,564,350	1,336 800	$257,470
32 weeks	305 242,600	37,449,140	7.914 805

Zinc value, the week, $216,450; 32 weeks, $6,821,980
Lead value, the week, $ 41,020; 32 weeks, $1,092,925

The average prices for zinc ore for the week were $50.53; for the year, $44.70 per ton. For lead ore the average was $61.41 per ton for the week, and $58.37 for the year.

The following table shows the average monthly prices of zinc and lead ores in Joplin, by months:

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1904.	1905.	Month.	1904.	1905.
Jan.	33.33	52.00	Jan.	55.55	61 50
Feb.	33.63	52.77	Feb.	56.37	57.62
March	35.40	47.40	March	57.20	57.20
April.	35.75	42.88	April.	58.00	58.00
May	34.87	43.31	May	57.77	58.27
June.	32.93	40.75	June.	56.60	57.80
July.	33.37	43.00	July.	53.00	58.00

Mining Stocks.

New York. Aug. 16.

Transactions on the exchange have been large during the week, but there has been less special interest in the industrials. Amalgamated Copper closed at $84½. American Smelting & Refining has been strong, closing at $128¾ for the common and $122½ for the preferred. United States Steel has not been a feature; the preferred is still above par.

On the Consolidated Exchange there were a few sales of Comstock shares, but not much interest was shown in them. Of other mining stocks Daly changed hands at $1.50; Elkton at 43c.; Work at 9c.; Sandstorm (Nevada), at 64c. per share.

In the curb market the Greene stocks were less a feature than in some recent weeks. Greene Copper sold for $25. British Columbia was quoted at $7⅜, while United Copper was strong around $34½ for the common stock, and $78½ for the preferred.

Boston. Aug. 15.

As might be expected, the Copper Range episode of a week ago has virtually killed the dull market for copper shares that was getting well under way. At the present time it is a dull and uninteresting state of affairs that presents itself. How long this will last it is hard to say. Speculation in these issues had been nursed along and the public was beginning to take hold in good shape, but this little warfare between a few individuals has knocked bullish enthusiasm into a cocked hat, strange as it may seem. This is to be regretted at this time, as the metal market was probably never in such a strong position as now, and legitimately so. The underlying conditions for a bull market could not be better than at present, but this counts for naught. Criticism is sharp and it now looks as if the whole Copper Range matter would be taken into the courts.

Looking the list over, it is found that changes, with but few exceptions, are unimportant compared with those of a week back. Copper Range itself has varied from $72.75 to $66, with $3 of the decline occurring today. The close tonight was $1.25 above the low point. Lately the heavy buyers of a week or two ago appear as the sellers, and the sellers as the buyers. This probably does not indicate anything, except the vagaries of stock market manipulation. Lawson has come out with a statement that he controls a majority of the 384,000 shares out, but this is not taken seriously. President Paine claims that Burrage and Lawson owe some $400,000 or $500,000 on account of the old Trimountain deal, the collection of which is doubtful.

Centennial is selling with the final $2 assessment paid, and in reality is over $1 below a week ago at $24.25. United Copper had a smart spurt last week, rising from $32.25 to $37 in a few hours; subsequently it reacted to $34.50. Allouez sold up $1.75, to $34.87½, losing over $1 of it. For the seven days ended August 11 there were 4,080 tons of Allouez rock treated, yielding 88 tons mineral, with a copper content of 2.15%, or 43 lb. to the ton of rock. Mohawk spurted $1.50, to $55.50, but lost $1 of it. The transactions were so small that the advance is to be wondered at. Old Dominion fell $1.50, to $26.50, owing to the slight falling off in the July output. United States has varied from $33.75 to $32.50, closing at the latter price. The announcement of the third 50c. Parrot dividend had no effect on the stock and the utter lack of business in this stock gives belief that it is pretty well corralled by Amalgamated people. Tecumseh has varied from $6.87½ to $7.25. The drill at this property is still in the Kearsarge lode and at a depth of over 500 ft. Trinity spurted to $9, but lost most of the advance. From advices received it would seem as if this company was about to do business at the property. Osceola is $2 lower for the week at $98. Utah Copper has been active on the curb and rose $5.50, to $27.50. North Butte has sold at $34.50@$36, and Arizona Commercial at $18.50@$18. July earnings of the North Butte are stated as $196,000. Dividend payments are expected in October.

Colorado Springs. Aug. 12.

The market for Cripple Creek shares on the local exchange seems to be taking a summer vacation and prices and the volume of trading remains stationary.

El Paso is the only stock varying from prices of one week ago; this stock is inclined to shade off a little. Nothing of importance has developed in regard to it since last week. The suit threatened against the taking over of the Beacon Hill-Ajax claim will probably be compromised. This stock sold on today's market for $1.27. Portland is selling for $2.30. Findley is traded in lightly at 71c. Isabella remains dull around 29c. Gold Sovereign is selling for 10½c. Elkton is 42c. bid with 44c. asked.

San Francisco. Aug. 10.

Business generally has been dull this week, and dealing in the Comstocks has been light. Ophir dropped to $6.75, while Mexican sold at $1.35; Consolidated California & Virginia, $1.30; Hale & Norcross, $1.25. The lower priced stocks were generally little noticed.

The Tonopahs were also quiet, and not very strong. At the close, Montana Tonopah sold around $3.10; Tonopah Belmont, $1.30; North Star, 60c.; Original Bullfrog, 24c. per share.

Oil stocks are looking up a little, and more business was done. Monte Cristo sold at 82c.; Home, 50c.; Four Oil, 46c.; Occidental, 2c. The best demand was for Four Oil and Home.

Dividends.

Company.	Payable.	Rate.	Amount.
†Amalgamated Copper	Aug. 28	$1.25	$1,933,750
American Coal	Sept. 1	1 25	62,500
Cambria Steel Co	Aug. 15	0 75	675,000
El Paso	Aug. 9	0.02	49,000
Greene Con. Copper	Aug. 21	0 40	345,600
Homestake	Aug. 25	0.50	109,200
N. Y. & Hond. Rosario	Aug. 26	0.15	15,000
Pressed Steel Car, pfd.	Aug. 29	1.75	218,750
Quincy, copper	Aug. 24	3.00	300,000
Standard Oil	Sept. 15	6 00	5,820,000
Tonopah. of Nev.	Aug. 22	0.25	250,000
U. S. Cast Iron Pipe & Fdy. pfd.	Sept. 1	1.75	218,750
U. S. Steel, pfd	Aug 30	1.75	6,304,919

*Monthly. §Bi-monthly. †Quarterly. ‡Semi-Annually.

St. Louis. Aug. 12.

Adams, silver $1,500,000 capital, shares $10.00; last dividend paid Jan. 1905 of 5c per share.

Central Lead has been retired and withdrawn from the market at $155.00.

	High.	Low.
American Nettie	.25	.10
Center Creek	$2.00	$1.50
Central Coal & Coke	65.00	63.25
" " " pfd.	79.00	78.00
Columbia	1.00	.25
Con. Coal	30.00	29.00
Doe Run	131.00	125.00
Granite Bimetallic	.37	.12
St. Joe	16.50	15 00

LONDON. (*By Cable.**) Aug. 15.

	£	s.	d.
Camp Bird	1	14	10½
Consolidated Gold Fields	6	2	6
De Beers	17	0	0
Dolores	$7.50 @ 8.50		
East Rand	7	8	9
El Oro	1	3	9
Esperanza	2	16	3
Modderfontein	8	16	3
Rand Mines	9	1	3
Rio Tinto	67	10	0
Simmer and Jack	1	11	10½
Stratton's Independence	0	9	9
Tomboy	1	4	4½

*Furnished by Wm. P. Bonbright & Co., New York.

STOCK QUOTATIONS.

NEW YORK. Week August 9.

Name of Company.	High	Low	Clg.	Sales
*Amalgamated	85	83⅝	83⅞	105,820
Anaconda	118	115	116	16,000
Arizona Consolidated	30⅜	30	30⅛	2,400
British Col. Copper	7½	6⅞	7¼	7,200
Federal Min. & Smelt.	113	111	111	300
Federal Preferred	95⅝	93½	93½	3,600
Greene Copper	25⅜	24½	24½	15,800
Greene Gold	4⅜	4⅛	4⅛	13,700
Mitchell	6⅜	5⅜	6	1,225
Tennessee Copper	31	30½	31	1,600
Union Copper	1⅝	1½	1 9/16	2,550
United Copper	37½	32	34⅛	34,300
United Copper, Pref.	79	77	78	602

NEW YORK INDUSTRIALS.

Am. Smelting & Ref.	130⅜	126¾	127½	182,350
Am. Smelting & Ref., Pf.	123⅛	122	122	4,520
Colorado Fuel & Iron	47	45	46	18,600
National Lead	49	45¾	45¾	35,180
National Lead, Pf.	48½	47	47	3,650
Pittsburg Coal	14⅜	14⅜	14⅜	500
Pittsburg Coal, Pf.	55⅜	53½	53½	400
Republic I. & S.	22	21	21½	9,380
Republic I. & S., Pf.	87⅞	86	87½	11,410
Tenn. Coal & Iron	91⅜	89½	89½	25,740
U. S. Red. & Ref., Pf.	70½	70⅛	70½	
U. S. Steel	36⅞	35½	35⅝	214,980
U. S. Steel, Pf.	105	103⅛	104½	244,020
Bethlehem Steel	34⅜	32	34	3,200
Bethlehem Steel, Pf.	91½	89¾	90	2,100
Standard Oil	624	621	623	68

BOSTON.

Allouez	34⅞	33¼	33½	8,193
Amalgamated	85	84	84	5,880
Atlantic	18¼	17½	18	1,785
Bingham	31	30⅛	30½	815
Boston Consolidated	8⅜	8	8⅛	2,112
Calumet & Hecla	675	670	675	33
‡§Centennial	25½	23¼	24½	5,120
Mercur	.58	.58	.58	850
Copper Range	72¾	66	66	34,238
Daly-West	14¼	13¾	14	1,620
Franklin	2¾	2¾	2¾	20
Elm River	12⅞	11¾	12	690
Granby	7½	7	7	4,340
Green Con. Copper	25½	24¼	24½	4,886
Isle Royale	23	22	22	835
‡Mass	9¼	8⅝	8⅝	595
Michigan	14½	14	14⅛	360
Mohawk	55½	54	54½	2,206
Old Dominion	27½	26½	27	460
*Osceola	100	98	98	618
Parrot	25½	25½	25½	50
*Quincy	103	101	103	89
Shannon	7¾	7¼	7¼	1,375
Tamarack	125	125	125	65
Tecumseh	7¼	6¾	7	1,400
United Copper, com	37	32	34½	5,070
*United States	36¾	32¼	32½	3,205
United States Coal & Oil	10½	10¼	10⅜	380
Winona	46	45¾	45¼	550
*Utah	11¾	11⅜	11¾	200
Wolverine	120	119	120	1,010

PHILADELPHIA.

Cambria Steel	27½	27⅛	27¼	2,768
Philadelphia Co	48	46¼	47¾	7,578
Tonopah	14¼	14¼	14¼	1,033

PITTSBURG.

Crucible Steel	12¾	12⅜	12⅝	3,647
Crucible Steel, Pref.	64⅞	64¾	65½	4,238
O. Tonopah	.34	.32	.33	4,385

COLORADO SPRINGS.

Name of Company.	First	High	Low	Clg.
Elkton	45	45	41	41
El Paso	118½	129½	118½	126
Isabella	29	29¾	28¾	29
Portland	225	240	225	230
Vindicator	80	85	80	80

SAN FRANCISCO.

Best & Belcher	1.25	1.30	1.25	1.25
Bullion	.37	.39	.36	.36
Caledonia	.43	.43	.41	.41
Confidence	.90	.90	.80	.80
Con. Cal. & Va	1.30	1.30	1.25	1.25
Gould &Curry	.16	.16	.14	.14
Hale & Norcross	1.70	1.70	1.50	1.50
Mexican	1.30	1.35	1.25	1.25
Occidental Con	.87	.87	.87	.87
Ophir	6.75	6.75	6.92	6.62
Savage	.60	.62	.60	.61
Sierra Nevada	.36	.36	.30	.35

*Ex-dividend. †1st Instalment Paid.
‡Assessment Paid. §2d Instalment Paid

Monthly Average Prices of Metals.

SILVER.

Month.	New York.		London.	
	1904.	1905.	1904.	1905.
January	57.005	60.690	26.423	27.930
February	57.592	61.023	26.665	28.047
March	56.741	58.046	26.164	26.794
April	54.202	56.600	24.974	26.108
May	55.430	57.832	25.578	26.664
June	55.673	58.422	25.644	26.910
July	58.095	58.915	26.760	27.163
August	57.806	.....	26.591	.....
September	57.120	.....	26.349	.....
October	57.923	.....	26.760	.....
November	58.453	.....	26.952	.....
December	60.563	.....	27.930	.....
Year	57.221	.....	26.399	.....

The New York prices are in cents per fine ounce; the London quotation is in pence per standard ounce, .925 fine.

COPPER.

	NEW YORK.				LONDON.	
	Electrolytic.		Lake.			
	1904.	1905.	1904.	1905.	1904.	1905.
Jan.	12.410	15 008	12 553	15.128	57.500	68.262
Feb.	12.063	15.011	12.245	15.136	56.500	67.963
March	12.299	15.125	12.551	15.250	57.321	68.174
April	12.923	14.920	13.120	15.045	58.247	67.017
May	12.758	14.627	13.000	14.820	57.321	64.875
June	12.269	14.673	12.399	14.813	56.398	65.881
July	12.380	14.888	12.505	15.005	57.256	66.887
Aug.	12.343	.....	12.468	.....	56.952	.....
Sept.	12.495	.....	12.620	.....	57.645	.....
Oct.	12.993	.....	13.118	.....	60.012	.....
Nov.	14.284	.....	14.456	.....	65.085	.....
Dec.	14.661	.....	14.849	.....	66.384	.....
Year	12.823	.....	12.990	.....	58.587	.....

New York prices are in cents per pound. Electrolytic quotations are for cakes, ingots or wire bars; cathodes are usually 0.25c lower. The London prices are in pounds sterling, per long ton of 2,240 lb., standard copper.

TIN IN NEW YORK.

Month.	1904.	1905.	Month.	1904.	1905.
Jan.	28.845	29.325	July	26.573	31 760
Feb.	28.087	29.262	August	27.012	.....
Mar.	28.317	29.523	Sept.	27.780	.....
April	28.132	30.525	Oct	28.596	.....
May	27.718	30.049	Nov.	29.185	.....
June	26.325	30.329	Dec.	29.286	.....
			Av., year.	27.986	.....

Prices are in cents per pound.

LEAD IN NEW YORK.

Month.	1904.	1905.	Month.	1904.	1905.
Jan.	4.347	4.552	July	4.192	4.524
Feb.	4.375	4.450	Aug.	4.111	.....
Mar.	4.475	4.470	Sept.	4.200	.....
April	4.475	4.500	Oct	4.200	.....
May	4.423	4.500	Nov.	4.200	.....
June	4.496	4.500	Dec.	4.600	.....
			Av., year.	4.309	.....

Prices are in cents per pound.

SPELTER.

Month.	New York.		St. Louis.		L'nd'n
	1904.	1905.	1904.	1905.	1905.
January	4.863	6.190	4.673	6.032	25.063
February	4.916	6.139	4.717	5.989	24.594
March	5.057	6.067	4.841	5.917	23.825
April	5.219	5.817	5.038	5.667	23.813
May	5.031	5.434	4.853	5.284	23.594
June	4.760	5.190	4.596	5.040	23.875
July	4.873	5.396	4.723	5.247	23.938
August	4.866	.....	4.716	.....	.....
September	5.046	.....	4.896	.....	.....
October	5.181	.....	5.033	.....	.....
November	5.513	.....	5.363	.....	.....
December	5.872	.....	5.720	.....	.....
Year	5.100	.....	4.931	.....	.....

New York and St. Louis prices are in cents per pound. The London prices are in pounds sterling per long ton (2,240 lb.) good ordinary brands.

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

(See also Market Reviews.)

ABRASIVES—		
Bort as to size	carat,	$10.00@$18.00
Carborundum, f.o.b. Niagara Falls, powd	lb.	.08
Grains	"	.10
Corundum, N. C	"	.07@.10
Chester, Mass	"	.04½@.05
Craigmont, Ont	"	.05½@.06½
Mont. f.o.b. Chicago	"	.07@.07½
Crushed Steel, f.o.b. Pittsburg	"	.05½
Emery, in kegs: Turkish flour	"	.03½
Grains	"	.05@.05½
Naxos flour	"	.03½
Grains	"	.05@.05½
Chester flour	"	.03½
Grains	"	.05@.05½
Peekskill, f.o.b. Easton, Pa., flour	"	.01½
Grains, in kegs	"	.02½
Garnet, per quality	sn ton	25.00@35.00
Pumice Stone, Am. Powd.	lb.	.01 3-5@.02
Italian, powdered	"	.01½@.01⅝
Lump, per quality	"	.04
Rottenstone, ground	"	.02½@.04½
Lump, per quality	"	.06@.20
Rouge, per quality	"	.10@.30
Steel Emery, f.o.b. Pittsburg	"	.07
ALCOHOL—Grain	gal.	2.38
Refined wood, 95@97%	"	.70@.75
Purified	"	1.25@1.30
ALUM—Lump	100 lb.	1.75
Ground	"	1.85
ALUMINUM—Sulphate, com'l.	"	75@1.25
AMMONIUM—		
Bromide	lb.	.22
Carbonate	"	.08
Muriate grain	"	.05½@.05⅞
Lump	"	.09½
ARSENIC—White	"	.02¾@.03
Red	"	.06⅝@.06¾
ASPHALTUM—		
Barbadoes	"	.02½@.03
Cuban	"	.01½@.03½
Egyptian, crude	"	.06@.07
Gilsonite, Utah ordinary	"	.03@.03½
Trinidad	"	35.00
BARIUM—		
Carb. Lump, 80@90%	sh. ton.	25.00@27.00
92@98%	"	28.00@29.00
Powdered 80@90%	lb.	.01¾@.02
Chloride com'l	100 lb.	1.35@1.50
Chem. pure cryst	lb.	.05
Nitrite, powdered	"	.05
Sulphate (Blanc Fixe)	"	.02
BARYTES—		
Am. Crude No. 1	sh. ton.	9.75
Crude No. 2	"	8.00
Crude No. 3	"	7.00
Floated	"	16.75@18.00
Foreign floated	"	20.00
Snow-white	"	17.25@18.75
BAUXITE—Ga. or Ala. Mines:		
First grade	lg. ton.	5.25@5.50
Second grade	"	4.50@4.75
Arkansas, first grade	lg.	5 00@5.50
Second grade	"	4.50@4.75
Washed ore	"	6.00@7.00
BONE ASH	100 lb.	.02½@.02½
BORAX	"	.07½@.07½
CALCIUM—Acetate, gray	"	2.30
Acetate, brown	"	1.55
Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J.	sh. ton.	65.00
Chloride, f.o.b. works	"	9.00@10.00
CEMENT—		
Portland, Am. 500 lb.	bbl.	1.55@1.60
Foreign	"	1.25@1.75
"Rosendale," 300 lb. (in sacks)	"	.85
Slag cement	"	.65
	"	.75@1.25
CHLORINE—Liquid		.30
Water		.10
CHROME ORE—		
(50%) ex-ship N. Y.	lg. ton.	18.50@19.00
Bricks, f.o.b. Pittsburg, M.	"	175.00
CLAY, CHINA—Am. common ex-dock, N. Y.	"	7.75@8.00
Am. best ex-dock, N. Y.	"	9.00@9.25
English, common	"	11.00@11.25
Best	"	16.75
COPPERAS—Bulk	100 lb.	$0.47½
In bbls	"	.52½
CRYOLITE	lb.	.06½
EXPLOSIVES—		
Blasting powder, A	.25-lb. keg	.65
Blasting powder, B	"	1.40
"Rackarock," A	lb.	.25
"Rackarock," B	"	.18
Judson R.R. powder	"	.10
Dynamite (20% nitro-glycerine)	"	.13
(30% nitro-glycerine)	"	.14
(40% nitro-glycerine)	"	.15
(50% nitro-glycerine)	"	.16½
(60% nitro-glycerine)	"	.18
(75% nitro-glycerine)	"	.21
Glycerine for nitro	"	.11@.11½
FELDSPAR—Ground	sh. ton.	9.75@10.00
FIRE BRICK.		
American	per M.	20.00@30.00
Imported	"	30.00@45.00
St. Louis No. 1	"	16.00
" No. 2	"	14.00
Extra	"	20.00@23.00
FIRE CLAY.		
St. Louis mill	per ton	2.50
FLUORSPAR—		
Domestic f.o.b. shipping port:		
Lump	sh. ton.	8.00@10.00
Ground	"	11.50@13.50
Gravel	"	4.25@4.50
FULLER'S EARTH—Lump	100 lb.	.80
Powdered	"	.85
GRAPHITE—		
Am. pulverized	"	45.00
Best flake	"	150.00
Ceylon, common pulv	"	.02½@.03½
Best, pulverized	"	.04@.08
German, com. pulv	"	.01½@.01½
Best, pulverized	"	.01½@.02
Italian, pulverized	"	.01½
GYPSUM—Ground	sh. ton.	8.00@8.50
Fertilizer	"	7.00
Rock	lg. ton.	4.00
English and French	"	14.00@16.00
INFUSORIAL EARTH—		
Ground Am. best	"	20.00
French	"	37.50
German	"	40.00
LEAD—Acetate, white	lb.	.09@.09½
Brown	"	.07@.07½
Nitrate, com'l	"	.06½
" granular	"	.08½
MAGNESITE—Greece.		
Crude (95%)	lg. ton.	6.50@7.00
Calcined	sh. ton.	16.50@17.00
Bricks, domes, per qual. f.o.b. Pittsburg	M.	160@200
MAGNESIUM—		
Chloride, com'l	lb.	.01¾
Sulphate	100 lb.	.50@1.25
MANGANESE—		
Crude powdered:		
70@75% binoxide	lb.	.01½@.01½
75@85% binoxide	"	.01½@.02½
85@90% binoxide	"	.02½@.03½
90@95% binoxide	"	.03½@.05½
Ore	unit.	.18@.20
MARBLE—Flour	sh. ton.	6.00@7.00
MINERAL WOOL—		
Slag, ordinary	"	19.00
Selected	"	25.00
Rock, ordinary	"	32.00
Selected	"	40.00
OZOKERITE	lb.	11½
PAINTS AND COLORS—		
Litharge, Am. powdered	"	.05½@.06½
English glassmakers'	"	.08½@.08⅝
Lithophone	"	.03½@.06½
Metallic, brown	sh. ton.	19.00
Red	"	16.00
Ocher, Am. common	"	8.50@9.00
Best	"	16.00
Dutch, washed	lb.	.02½
French, washed	"	.01½@.01⅞
Paris green, pure, bulk	"	.12
Red lead, American	"	.06½@.06½
Foreign	"	.07@.08½
Turpentine, spirits	gal.	.64
White lead, Am., dry	lb.	.05½@.05½
American, in oil	"	.06½@.06⅝
Foreign, in oil	"	.09@.09½
Zinc white, Am. extra dry	"	.04⅝@.04⅝
Foreign, red seal, dry	"	.06@.08½
Green seal, dry	"	.06½@.09½
POTASSIUM—		
Bicarbonate crystal	lb.	$0 08½
Powdered or granulated	"	.14
Bichromate, Am	"	.08½@.084
Scotch	"	.08½@.08¾
Bromide	"	.15
Carbonate (80@85%)	"	3.50@4.00
Caustic, ordinary	"	.04½
Elect. (90%)	"	.06½
Chlorate, powdered	"	.08½@.08½
Crystals	"	.08½@.08¾
Cyanide (98@99%)	"	.18@.19
Kainit (bulk)	lg. ton.	8.50
Manure salt 20%	"	14.75@15.75
Double Manure Salt, 48@53%	100 lb.	1.16½@1.19½
Muriate	"	1.90@1.95
Permanganate	lb.	.09½@.09¾
Prussiate, yellow	"	.13½@.13¾
Red	"	.35
Sulphate	100 lb.	2.18½@2.21½
SALT—N. Y. com. fine 280 lb. bbl.		.72@1.18
N. Y. agricultural	sh. ton.	4.40
SALTPETER—Crude	100 lb.	4.00@4.25
Refined	"	4.25@4.75
SILICA—		
Ground quartz, ord'ry	sh. ton	9.00@10.00
Best	"	12.00@13.00
Lump Quartz	"	2.50@4.00
Glass sand	"	2.75
Infusorial earth, crude		25.00
Calcined and floated		32.00
SILVER—Nitrate, crystals	oz.	.36½
SODIUM—		
Acetate	lb.	0.04¼
Bicarb., ord., bulk, f.o.b. works	100 lb.	1.30
Extra domes, f.o.b. works	"	3.50
Bichromate	lb.	.06¾
Bromide	"	.20
Carbonated ash, high test, in bags, f.o.b., works	100 lb.	.75@.77½
Foreign, f.o.b. N. Y.	"	.85@.87½
Caustic, 60@78%, f.o.b., works	"	1.75@1.85
Foreign, f.o.b. N. Y.	"	1.90@1.95
Chlorate, com'l	"	.08½@.08½
Cyanide, ("100% KCN")	"	.18@.19
Hyposulphite, Am	"	1.50@1.60
German	"	1.75@2.00
Phosphate	lb.	.02½@.02½
Prussiate	"	.09½@.09½
Sal soda, f.o.b. works	100 lb.	.60
Foreign, f.o.b. N. Y.	"	.85
Silicate, concentrated	lb.	.05
Com'l	"	.01
Sulphate, com'l	100 lb.	.65
SULPHUR—Best seconds, per ton,		21.00
Roll	lb.	1.85
Flour	"	1.90
Flowers, sublimed	"	2.20
TALC—North Carolina	sh. ton.	15.50@23.50
N. Y. Fibrous best	"	10.25
French, best	"	20.00
Italian, best	"	30.00
TAR—Oil bbl. (50 gal.)	bbl.	5.40
TIN—Bi-chloride, 45%	lb.	.09½
Crystals	"	.23½
URANIUM—Oxide	"	2.25@3.00
ZINC—Metallic ch. pure	"	.07@.09½
Chloride solution, com'l	"	.02½
Chloride, granular	"	.04½@.04½
Dust	"	.05½@.05½
Sulphate	"	.02@.02½

The Rare Earths.

BORON—Nitrate	lb.	$1.50
CERIUM—Nitrate	"	12.00
DIDYMIUM—Nitrate	"	45.00
ERBIUM—Nitrate	"	67.50
GLUCINUM—Nitrate	"	13.50
LANTHANUM—Nitrate	"	56.00
LITHIUM—Carbonate	"	1.50
LITHIUM—Nitrate	oz.	.60
STRONTIUM—Nitrate	lb.	.07@.07½
THORIUM—Nit. 49@50%	"	4.50
URANIUM—Nitrate	oz.	.25
ZIRCONIUM—Nitrate	lb.	10.00

Note—These quotations are for wholesale lots in New York, unless otherwise specified, and are generally subject to the usual trade discounts. Readers of THE ENGINEERING AND MINING JOURNAL are requested to report any corrections needed, or to suggest additions which they may consider advisable.